RAILROAD GAZETTE

FRIDAY, JUNE 25.

Train Accidents in May.

The following accidents are included in our record for the month of May :

COLLISIONS.

REAR.

3d, noon, passenger train on Atlantic & Pacific ran into some cars broken loose from a preceding freight near Hackberry, Ari., wrecking several cars. A brakeman on the freight went back with the signal, but was driven from the track by attack of a gang of coyotes.

4th, very early, freight on Chicago & Alton broke in two near Delavan, Ill., and rear section ran into forward one, wrecking several cars and killing 4 tramps, who were stealing a ride in a box car.

10th, night, freight on Pennsylvania Railroad ran into some cars which had been blown from a siding upon the main track near Conemaugh, Pa., by a violent gale, wrecking engine and 20 cars, killing 3 trainmen and injuring 3 others.

10th, night, freight on Pittsburgh, Cincinnati & St. Louis broke in two near Beaver Falls, Pa., and rear section ran into forward one, wrecking several cars and injuring a brakeman.

11th, night, freight on Troy & Boston broke in two near North Pownal, Vt., and rear section ran into forward one, damaging several cars.

13th, p. m., Chicago & Iowa freight ran into rear of Chicago, Burlington & Quincy freight in West Aurora, Ill., wrecking caboose.

15th, a. m., circus train on Delaware, Lackawanna & Western broke in two near Binghamton, N. Y., and rear section ran into forward one, wrecking several cars and injuring 12 of the circus men.

18th, a. m., freight on Norfolk & Western ran into preceding freight at Prospect, Va., damaging 6 cars.

19th, a. m., passenger train on Texas & Pacific ran over a misplaced switch and into freight standing on the siding in Longview, Tex., damaging engine and several cars.

21st, a. m., freight on New Haven & Northampton broke in two near Holyoke, Mass., and rear section ran into forward one, damaging several cars.

21st, night, passenger train on Atlantic & Pacific ran into rear of freight at Springer, N. M., damaging engine and several cars and injuring 3 passengers.

22d, a. m., circus train on Old Colony broke in two near Attleboro, Mass., and rear section ran into forward one, wrecking 1 car and injuring 13 circus men slightly.

23d, noon, passenger train on New York Central & Hudson River ran over a misplaced switch and into freight standing on siding in Buffalo, N. Y., damaging several cars.

24th, night, passenger train on Grand Trunk broke in two near Brompton, Ont., and rear section ran into forward one, damaging 3 cars and injuring 40 persons slightly.

24th, night, freight on Central Vermont ran over a misplaced switch and into another freight on siding at South Vernon, Vt., wrecking several cars.

25th, a. m., construction train on Houston & Texas Central ran into rear of freight near Corsicana, Tex., wrecking several cars.

29th, night, freight on Western & Atlantic ran into preceding freight in Chattanooga, Tenn., wrecking several cars and injuring 2 trainmen.

BUTTING.

11th, night, 25 coke cars broke loose from freight on Pennsylvania Railroad near Johnstown, Pa., and ran back down grade and into the head of a following freight. The engine and several cars were wrecked ; 3 trainmen hurt.

12th, night, freight on Utah & Northern broke in two near Eagle Rock, Idaho, and the detached cars ran back down the steep grade and into the head of a following freight, which was going up grade with 3 engines. The 3 engines and 11 cars were piled up in a bad wreck, killing 1 trainman and injuring 3 others seriously.

13th, a. m., butting collision between two freights on Hannibal & St. Joseph near Brookfield, Mo., wrecked both engines and 11 cars, and injured 2 trainmen.

14th, a. m., butting collision between passenger train and wild engine on Albany & Susquehanna near Schenevus, N. Y., damaged both engines and injured 3 trainmen. It is said that the engineer on the wild engine was asleep.

24th, a. m., butting collision between two freights on Pittsburgh, Cincinnati & St. Louis near Newark O., wrecked both engines and several cars.

27th, a. m., butting collision between passenger and freight trains on Pittsburgh & Western near Youngstown, O., damaged both engines.

27th, night, butting collision between two freights on Denver & Rio Grande in Denver, Colo., damaged both engines and several cars.

27th, night, butting collision between passenger and freight train on Chicago & St. Louis near Ancona, Ill., damaged both engines.

CROSSING.

20th, night, Baltimore & Ohio passenger train ran into Pittsburgh, Cincinnati & St. Louis freight at crossing in Columbus, O., wrecking 2 cars.

26th, a. m., Central Railroad freight ran into Brunswick & Western passenger at crossing in Albany, Ga., wrecking a car.

DERAILMENTS.

BROKEN RAIL.

11th, p. m., freight on Missouri Pacific was derailed near Urbana, Kan., by broken rail.

16th, night, passenger train on Cincinnati, New Orleans & Texas Pacific was derailed near Flat Rock, Tenn., by a broken rail and the engine upset, injuring engineer and fireman.

18th, night, freight on Norfolk & Western was derailed near Pulaski, Va., by broken rail, and 2 trainmen hurt.

19th, a. m , passenger train on Bradford, Eldred & Cuba was derailed near Little Genesee, N. Y., by a broken rail, injuring a trainman and 2 passengers.

19th, night, freight on Wabash, St. Louis & Pacific was derailed near Sadorus, Ill., by broken rail.

BROKEN FROG.

6th, a. m., freight on St. Louis, Iron Mountain & Southern was derailed at De Soto, Mo., by broken frog.

10th, night, freight on Chicago, Burlington & Quincy was derailed in Plattsmouth, Neb., by a broken frog.

SPREADING OF RAILS.

8th, a. m., passenger train on Texas & Pacific was derailed near Dallas, Tex., by spreading of rails, injuring a trainman and 2 passengers.

13th, a. m., passenger train on Wabash, St. Louis & Pacific was derailed near LaFayette, Ind., by spreading of the rails.

14th, a. m., freight on Jacksonville Southeastern was derailed near Centralia, Ill., by spreading of the rails. Brakeman was hurt.

17th, p. m., passenger train on Northern Pacific was derailed near Fort Ellis, Mon., by spreading of the rails. Two cars upset, killing a brakeman and injuring 2 passengers badly.

21st, a. m., freight on Texas & Pacific was derailed near Odessa, Tex., by spreading of the rails.

26th, p. m., freight on Missouri Pacific was derailed near Independence, Mo., by spreading of the rails.

26th, night, freight on Dayton & Ironton was derailed near Berlin, O., by spreading of the rails, and engine upset, killing engineer and injuring fireman.

28th, p. m., passenger train on Louisville & Nashville was derailed near McDonald, Ala., by spreading of the rails, damaging engine and two cars, injuring 2 trainmen and 2 passengers.

30th, very early, freight on Missouri, Kansas & Texas was derailed near Denison, Tex., by spreading of the rails.

30th, night, passenger train on Vicksburg, Shreveport & Pacific was derailed near Delta, La., by spreading of the rails, and the engine upset, injuring 2 trainmen.

BROKEN WHEEL.

24th, a. m., freight on Western North Carolina was derailed by a broken wheel just as the train was running upon a bridge near Round Knob, N. C. The derailed car struck the bridge truss, knocking it down, and the train and bridge went down into the creek. The engineer was badly hurt.

27th, night, engine and 2 cars of passenger train on Virginia Midland were derailed near Strong Point, Va., by a broken wheel, and the engine went down a bank, injuring 2 trainmen and a tramp who was stealing a ride.

BROKEN AXLE.

7th, a. m., freight on Lehigh Valley was derailed at Drake's Creek, Pa., by broken axle. The wreck caught fire and 13 cars were burned up.

7th, night, passenger train on New York, Ontario & Western was derailed near Livingston Manor, N. Y., by a broken axle under the tender, and 2 cars were thrown down a bank, injuring a trainman.

11th, a. m., freight on New York, Lake Erie & Western was derailed near Otisville, N. Y., by broken axle.

13th, p. m., freight on Lake Shore & Michigan Southern was derailed near Burr Oak, Mich., by broken axle.

31st, night, passenger train on Baltimore & Ohio was derailed near Barnesville, O., by broken axle, and a trainman was hurt.

BROKEN BRAKE-BEAM.

1st, very early, coal train on Erie & Wyoming Valley was derailed at Hawley, Pa., by a broken brake-beam dropping down on the track.

ACCIDENTAL OBSTRUCTION.

18th, p. m., freight on Rensselaer & Saratoga was derailed near Albany, N. Y., wrecking engine and 8 cars and injuring conductor. The wreck caught fire and the cars were burned up. A new automatic gate had been just put in at a road crossing, and the man in charge had been experimenting with it and had left it down across the track when it should have been raised.

19th, a. m., freight on Illinois Central was derailed near Murphysboro, Ill., by a tie which fell from a car. Two cars were wrecked and a tramp who was stealing a ride badly hurt.

CATTLE.

6th, night, freight on Wabash, St. Louis & Pacific ran over a mule near Renick, Mo., and engine and 14 cars were derailed and a brakeman hurt.

13th, night, passenger train on Baltimore & Ohio ran over a cow near Deshler, O., and sleeping car was derailed and upset, injuring 14 passengers slightly.

15th, very early, freight on Texas & Pacific ran over a cow near Mineola, Tex., derailing engine and 8 cars and injuring the engineer.

15th, a. m., freight on Cairo, Vincennes & Chicago ran over a cow near Hatton, Ill., and was derailed.

15th, p. m , construction train on Missouri, Kansas & Texas ran over a cow near Colbert, Ind. Ter., derailing several cars and injuring a brakeman.

23d, a. m., freight on Chicago & Alton was derailed near Slater, Mo., by running over a cow. The engine was wrecked, a trainman killed and 2 others hurt.

27th, p. m., freight on Houston & Texas Central was derailed near Corsicana, Tex., by running over a cow.

LAND-SLIDES AND WASH-OUTS.

2d, a. m., a land-slide came down upon a Northern Pacific freight as it was passing through a cut near Melton, Mont., throwing the engine and several cars from the track, killing the engineer and injuring 2 other trainmen.

12th, night, freight on Cincinnati, Hamilton & Dayton ran into a wash-out at Possum Run, O., and engine and several cars went down, injuring engineer and fireman.

12th, night, passenger train on Indiana, Bloomington & Western ran into a wash-out near Newcastle, Ind. The engine and baggage car went down into the gap, the engineer, fireman and a passenger were killed, the conductor, baggagemaster and a passenger badly hurt.

13th, night, passenger train on New York, Pennsylvania & Ohio ran into a wash-out near Osborne, O. A car upset, injuring 4 trainmen and a passenger.

13th, night, passenger train on Cincinnati, Washington & Baltimore ran into a wash-out near Belpre, O., and 5 cars were derailed.

14th, a. m., freight on Cincinnati, Indianapolis, St. Louis & Chicago ran into a wash-out near La Fayette, Ind., wrecking engine and several cars.

18th, night, freight on Missouri Pacific ran into a wash-out near Calhoun, Mo., and 14 cars wrecked.

19th, night, freight on Western North Carolina ran into a wash-out near Alexander, N. C., and was wrecked.

MISPLACED SWITCH.

18th, night, freight on Chicago, Milwaukee & St. Paul was derailed at Stillman Valley, Ill., by a misplaced switch, injuring fireman.

19th, p. m., freight on Marquette, Houghton & Ontonagon was derailed in Marquette, Mich., by a misplaced switch.

22d, p. m., freight on Troy & Greenfield was derailed in North Adams, Mass., by misplaced switch.

23d, night, passenger train on Missouri, Kansas & Texas was derailed near Hutto, Tex., by a misplaced switch.

30th, p. m., passenger on West Shore was derailed at East Buffalo, N. Y., by misplaced switch, and a trainman slightly hurt.

MALICIOUSLY CAUSED.

7th, night, engine of passenger train on Chicago, Burlington & Quincy was derailed in Chicago by a switch which had been purposely misplaced.

17th, night, freight on Louisville & Nashville was derailed near Ellison, Ky., by an obstruction placed on the track. Two trainmen slightly hurt.

UNEXPLAINED.

8th, a. m., freight on New York, Chicago & St. Louis was derailed near South Whitley, Ind., and 2 trainmen hurt.

11th, a. m., freight on Fitchburg road was derailed at Gardner, Mass., and 3 cars wrecked.

16th, p. m., passenger train on Long Island road was derailed near Syosset, N. Y., doing little damage.

19th, a. m., freight on Michigan Central was derailed near Canfield, Ont., and 5 cars wrecked.

24th, a. m., freight on Connecticut River was derailed near Greenfield, Mass. A car was thrown over between the tracks and against a passenger train which was passing on the other track, damaging several cars.

28th, night, freight on Louisville & Nashville was derailed at Bartlett, Tenn., and the fireman killed.

30th, very early, freight on New York, Lake Erie & Western was derailed at Big Flats, N. Y., wrecking 5 cars.

26th, a. m., freight on New York Central & Hudson River was derailed near Schenectady, N. Y., wrecking a car.

31st, night, freight on Pennsylvania Railroad was derailed near Pittsburgh, Pa., and 2 cars damaged.

OTHER ACCIDENTS.

BOILER EXPLOSIONS.

7th, a. m., engine of passenger train on Fitchburg road collapsed a flue when near Montague, Mass., and the engineer was badly scalded by escaping steam.

11th, p. m., engine of freight on Albany & Susquehanna exploded its boiler just as the train was going into Schenevus, N. Y. The engine was completely wrecked and a number of cars piled up on top of it. The engineer was killed and the fireman badly hurt. The engineer had just closed the throttle when the explosion took place. His body was found 200 ft. from the wreck, and pieces of the locomotive were picked up 500 ft. away.

29th, a. m., locomotive of construction train on Illinois Central exploded its boiler just after running into a siding at Wildwood, Ill. Engine was completely wrecked, engineer fatally hurt and 2 other trainmen badly scalded.

31st, very early, freight engine on International & Great Northern exploded its boiler just as it was starting out of the roundhouse at Palestine, Tex. The roundhouse was demolished and several of the enginses in it badly damaged by the falling walls. Two trainmen who were on the engine were instantly killed, and 17 train and shopmen who were in the roundhouse were hurt.

MISCELLANEOUS.

14th, night, as passenger train on Pittsburgh, Fort Wayne & Chicago was near Lima, O., a tree blown down by a gale fell upon the sleeping car, smashing in one side of the car. Two passengers were badly cut by broken glass.

24th p. m., as a train on the Soddy Coal Co.'s road was near Soddy, Tenn., a keg of powder on a coal car was ignited by a spark from the engine, and 100 kegs of powder exploded, completely destroying the engine and 2 cars, killing 2 trainmen who were on the cars and a man who was standing by the track waiting for the train to pass.

27th, p. m., engine of freight on Houston & Texas Central broke a tire when near Houston, Tex., but did not leave the track.

31st, p. m., engine of passenger train on New York Central & Hudson River blew out a cylinder-head when near Little Falls, N. Y., disabling the engine.

SUMMARY.

This is a total of 93 accidents, in which 23 persons were killed and 170 hurt. As compared with May, 1885, there was an increase of 31 accidents, of 15 killed and of 105 injured.

The five months of the current year to the end of May show a total of 432 accidents, 157 killed and 653 hurt; an average per month of 86 accidents, 31 killed and 131 injured.

A fuller statement of the totals and averages, with a summary of the causes of accident, will be found on another page.

MASTER MECHANICS' ASSOCIATION.

Thirteenth Annual Convention.

We conclude below our report of the Boston convention. As noted last week, the convention adjourned over from Wednesday afternoon to Friday morning, out of respect to Boston patriotism, as expressed in the establishment of the anniversary of the battle of Bunker Hill as a public holiday.

THE EXCURSION.

On Tuesday morning the members of the Association, with the members of the New England Railroad Association and invited guests, met on the steamboat "Empire State," which left Battery Wharf at 10 o'clock. An actual count showed 648 persons on board, including a large number of ladies. The boat ran down the harbor, along Nantasket Beach and then out to sea a short distance, turned northward and ran into Salem harbor, and then returned along the North Shore, skirting the beautiful sea-shore resorts of Boston, and giving the passengers an excellent view of Beverly Farms, Marblehead, Swampscott, Lynn and Nahant. On the trip an excellent view was had of the two yacht races in progress. Lunch and dinner was served on board, and the wharf was reached at 6 o'clock. The arrangements for the excursion were excellent, and it was thoroughly enjoyed, a view of the seashore and a glimpse at the ocean being a new experience to many of the visitors and a pleasant one for all. A number of the ladies added to the pleasure of the occasion by furnishing music and recitations.

A few of the members preferred solid land to the ocean, and went over the Fitchburg Railroad to North Adams and the Hoosac Tunnel.

THIRD DAY.

The convention was called to order by President BARNETT at 9:20 a. m. on Friday.

The first business in order was the report of the Committee on Balanced Slide Valves, which was read by Mr. BLACKWELL. In connection with this report several models and tracings were exhibited.

The report was accepted and submitted for discussion.

Mr. MEEHAN had not much to add to the statement he had sent to the committee. He had used several patterns of balanced valve, with the results expressed in the report. He had reached the conclusion that a balanced valve was a necessity.

Mr. BLACKWELL referred to the very excellent results reported on the New Jersey Central from the use of balanced valves.

Mr. WOODCOCK said that he had tried the Allen valve with balance arrangement on fast passenger engines doing heavy work. There had been much trouble with these engines on account of the wear on the valve seats, which was prevented by the balanced valve.

The discussion was then closed.

The Chair then appointed as a Committee on Resolutions, Messrs. Angus Sinclair, Forney and Cooke.

An invitation to visit Nantasket Beach by steamboat was received.

No report was presented by the Committee on Locomotive Guides and Crossheads. The question of continuing the committee was referred to the Committee on Subjects.

The report of the Committee on the Best Plan of Removing, Cleaning and Resetting Flues was then read by the Secretary.

The report was accepted and submitted for discussion.

Mr. C. HACKNEY called for information as to relative cost of welding and brazing flues.

Mr. JOHANN said that when he had charge of the Wabash road they had at Fort Wayne special machinery for brazing flues and at Moberly for welding flues. To determine the question of cost a special trial was made with 300 flues at each shop, and the cost of brazing was found to be less than of welding, the brazing of the 300 flues costing about $17, and of welding about $26. He would furnish exact figures.

The Committee was on motion continued for a year.

Mr. BLACKWELL referred to a cutter for cutting the flues to take them out. This cutter was similar to a pipe-cutter, but reversed, and had been used with much advantage in the Norfolk & Western shops. It was designed by Mr. W. C. Rolston, of the Shenandoah Valley shops at Roanoke, Va.

Mr. MEEHAN thought the question of clearing flues an important one. The milling machine cleaned the outside, but did not remove scale from the inside.

Mr. SETCHEL asked whether it was necessary to bead flues at the front end. He had not been in the habit of doing it and had had no trouble.

Mr. CAMPBELL'S experience had been similar to Mr. Setchel's.

A resolution was offered to the effect that it was the sense of the convention that it was not necessary to bead flues at the front end.

Mr. LAUDER referred to the absolute necessity of beading at the fire-box end.

Mr. JOHANN thought a formal expression of opinion unnecessary.

Mr. SETCHEL thought an expression of opinion was necessary and expedient. Any saving of expense was important under the close competition now prevailing.

Mr. BRIGGS had been accustomed to bead 30 or 40 flues in each boiler, in order to have their help in staying the flue sheet. In large boilers this was very necessary.

Mr. GRIGGS referred to the necessity of care in taking votes on such questions as this.

Mr. ALLEN COOK agreed with Mr. Briggs as to the expediency of beading flues at the front end, in order to strengthen the boiler.

Mr. JOHANN doubted the expediency of taking a vote, but favored full discussion.

Mr. BRIGGS believed in full discussion and also in a definite expression of the opinion of the Association. He believed that a part of flues should be beaded at the front end with the large boilers now used.

Mr. MCCRUM had not found it necessary to bead at the front end with small boilers, but with large boilers it must be done.

Mr. BLACK had formerly beaded the front ends. Of late he had tried concaving the front flue-sheet about ½ in. and found that then it was sufficient to set the tubes in front with an expander.

Mr. LAUDER thought much of the trouble with large boilers referred to was due to defective circulation of water and setting the flues too close together. When flues were set with an expander in a properly proportioned boiler that was sufficient. Beading might be necessary where the water was bad and there was much scale.

Mr. BRIGGS said that the use of a Dudgeon Expander was practically equivalent to beading.

Mr. LAUDER admitted that using a Dudgeon or a Prosser Expander would almost equal beading.

Mr. C. HACKNEY was troubled with very bad water, so that flues would not run over five months. With boilers of 60 in. diameter he had found no trouble with flues simply rolled at the front end.

Mr. MCCRUM had found that setting flues with an expander was quite sufficient.

Mr. STEVENS said that they beaded the front end, to strengthen the boiler, and stay the tube sheet.

Mr. LAUDER opposed beading in front on the ground of economy.

Mr. BRIGGS asked whether the beading had not been worn off when the flues pulled out of the back sheet.

Mr. MCCRUM said that was generally the case.

Mr. MILES thought that the tubes were not of much value as stays, owing to the unequal rate of expansion of tubes and barrel of boiler.

Mr. MCKENZIE had made a practical test of this matter, on a road where they had very bad water. With an engine with flues beaded at the front end they ran six months with no trouble, while when the flues were not beaded there was continual trouble from leaking.

Mr. COLLIER said that on a Southern road he had for many years simply rolled his flues at front end and had no trouble.

A standing vote on the resolution was asked for.

Mr. GENTRY asked to be excused from voting.

Mr. BLACKWELL suggested to amend the resolution by adding the words "when good water is used."

Mr. LAUDER thought that the question what good water is would be hard to define.

The resolution (that it is not necessary to bead flues at the smoke-box end) was adopted by a vote of 46 to 29.

The discussion was then closed.

Mr. JOHANN, by unanimous consent, moved that Messrs. P. I. Perrine, C. J. Parry, E. H. Williams and H. J. Brooks be chosen Honorary Members. Carried.

The report of the Committee on Shop Tools and Machinery was then read by the Secretary.

The report was received and submitted for discussion.

On motion discussion was dispensed with.

Mr. LAUDER presented an invitation to visit the experimental section of the Meigs elevated road.

The report of the Committee on Hammer Blow Test of Locomotives was then read by the Secretary. The Committee reported that under the resolution adopted last year they had held several joint meetings with the committee of the Franklin Institute on this subject and submitted the joint report, accompanied by drawings and diagrams.

The report was, on motion, received and filed.

Mr. SINCLAIR objected strongly to the report of the joint committee, believing that the effect of imperfect balance was very much exaggerated by the report. The effect of imperfect balance was not great and he objected to appropriating or soliciting money for any apparatus to test it.

Mr. COLEMAN, Associate Member, then made an address on the theory and practice of combustion, which was listened to with much interest. The chief point of Mr. Coleman's address was the necessity for heating the air supplied to the fire, of maintaining the highest possible temperature in the furnace, and of preventing anything which will lead to reduction of the temperature. He referred to the gradual development of the boiler, and, coming to the locomotive boiler, he doubted whether the increase in heating service and size of fire-box had kept pace with the increase in weight of the locomotive. He referred to some experiments he had made with a Wootten engine for the Italian Government with great success, burning coal-dust and lignite, the result being a great success. He believed that the success of the Wootten fire-box, there and elsewhere, was due to the large grate surface, and the use of a thin fire, insuring rapid and complete combustion and a high temperature in the furnace. He believed that the true development of the locomotive could be defined in two simple expressions—more complete combustion of coal and the compound locomotive, utilizing the full pressure of steam.

Mr. Coleman's address was direct and forcible, and was listened to with much interest.

On motion, the order for short discussions was omitted, and business was proceeded with.

The Committee on Subjects presented its report, recommending the following questions for discussion at the next annual meeting:

1. To Give Best Results, What Rule Should be Followed for Proportioning the Cylinders of an Engine, when Size of Driving-Wheels, Weight Available for Adhesion and Boiler Steam Pressure are given quantities.

2. Traction Increasers, their various types and relative merits; also cases in which their use can be recommended.

3. Cross-heads and Guide-bars; various types in use; materials used in their construction and results obtained.

4. Packing—various forms of piston packing in use, and results obtained, also most economical and satisfactory packing for piston rod, valve-stem, regulator and air pump stuffing boxes.

5. Washing out and Lighting up Engines; best systems in use for washing out, and most economical and expeditious mode of raising steam, and necessary plant for same.

6. Coaling up engines; the various plans in use, their relative cost and efficiency.

7. Standard form of tire section.

The report was received.

Two additional subjects were suggested—Lubricants, and (8) The Influence of the Man at the Throttle on the Wear of Driving Wheel Tires. The last named was made the eighth subject.

The subject, with the amendment made, was adopted.

The Committee on Place for Next Annual Meeting submitted three places: St. Paul or Minneapolis, New York and Philadelphia.

After some discussion, it was resolved to hold the next convention at St. Paul or Minneapolis, the selection between the two cities to be made by the Executive Committee.

A recess of ten minutes was then taken.

The Convention then proceeded to the election of officers for the ensuing year, the election being by ballot. The result was as follows:

President, William Woodcock, Central Railroad of New Jersey; Elizabethport, N. J.

First Vice-President, Jacob Johann, Chicago & Atlantic; Huntington, Ind.

Second Vice-President, R. H. Briggs, Chesapeake, Ohio & Southwestern; Elizabethtown, Ky.

Treasurer, George Richards, Boston & Providence; Boston, Mass.

Secretary, J. H. Setchel, Brooks Locomotive Works; Dunkirk, N. Y.

The elections were made unanimous by a rising vote.

Mr. WOODCOCK made his acknowledgments to the convention in a few well-chosen words, with much feeling.

Mr. JOHANN also acknowledged his election in a few feeling words, as did also Messrs. BRIGGS, SETCHEL and RICHARDS.

The convention recognized Mr. Setchel's long and faithful service by a unanimous vote and three hearty cheers.

On motion, the amount of the Secretary's salary was fixed at $800 per year, the same as last year.

Mr. THOMAS SHAW, of Philadelphia, was chosen an associate member.

Mr. GEORGE HACKNEY was then chosen a member of the Standing Committee on Subjects for three years.

On motion a committee to revise the constitution and by-laws was appointed, President Barnett to be a member, with instructions to have the report or draft for a new constitution printed and distributed to members at least 30 days before the next convention.

This Committee on Revision of Constitution consists of Messrs. J. Davis Barnett, M. N. Forney, Amos Pillsbury, J. N. Lauder and J. H. Setchel.

The report of the Committee on Resolutions was then presented and the usual resolutions of thanks were passed, a special vote of thanks to the press being afterward added.

On motion of Mr. LAUDER resolutions were passed favoring a suitable appropriation by Congress to maintain the Section of Steam Transportation in the National Museum at Washington.

The Association then adjourned to meet at St. Paul or Minneapolis on the third Tuesday in June, 1887.

EXHIBITS.

On the last day of the convention the Ideal Chair Co., Henry S. Bacon, Manager, of Boston, sent to hall two of its chairs for parlor cars.

A few other exhibits were represented on the last day. The H. W. Belknap Co., Bradford, N. H., make Belknap's axle paste and car lubricator, which is now undergoing tests on passenger cars on the Concord and the Boston and Lowell road.

The Tripp Metallic Packing Co., of Boston, manufactures Tripp's Metallic Packing for piston rods and cylinders.

Mr. James T. Connelly, Lima, O., presented his patent gusset connection for boilers.

The Clifton White Lead & Color Works, of New York, showed samples of car, bridge and roof paint of different colors. This paint, it is claimed, is specially adapted for railroad work.

The National Automatic Lubricator Co., John A. White, Manager, Concord, N. H., showed its automatic car journal lubricator, for which a large saving in oil is claimed, while no waste is required. This lubricator is in daily use on the Boston & Albany, the Boston & Lowell, the Boston & Providence, the Central Vermont, the Concord, the Connecticut & Passumpsic Rivers, the Old Colony and the Pennsylvania railroads.

Committee Reports to the Master Mechanics' Association.

We give below the reports of the several committees as submitted to the Master Mechanics' Association at its convention in Boston last week. The publication of the report on Balanced Slide Valves is delayed until the drawings appended can be engraved, and that of the report on Driving Wheel Brakes by lack of space:

DRIVING WHEEL CENTRES AND SECTION OF TIRES.

Your Committee appointed at the eighteenth annual convention, to consider the subject of "Standard Diameters of Driving Wheel Centres, and Standard Section of Tires," beg leave to submit the following report:

In considering the question of standard diameters for driving wheel centres, we have thought best to recommend such diameters as would enable the largest number of locomotives now in use to be brought to the proposed standards with the least trouble and expense.

To enable us to arrive at proper conclusions, we caused circulars to be sent to each member of the Association, requesting information as to the diameters of wheel centres now in use on their respective roads.

We have received replies from 38 of the leading roads, owning an aggregate of nearly 8,000 locomotives.

While we find a great variety of sizes of wheel centres, the variation is not so wide as to preclude the possibilities of bringing a large percentage of them to a standard.

Your Committee feels that this question is one of great importance, as well to the manufacturers of tires as to the railroads; as in the case of the manufacturers, the adoption of standard diameters of wheel centres by the railroads will enable them to carry a stock of standard tires, which can be made up at their convenience; and in the case of the railroads, the necessity for carrying a stock of tires will be obviated, because manufacturers will be able to fill orders at short notice.

If desirable, manufacturers can furnish tires bored to gauges, ready to be applied to the wheel centres. This will be a substantial benefit to both parties.

In considering this matter, your committee believes it most practicable to establish the diameters of the wheel centres, making them even inches, and allowing fractional parts of the inch to apply to the diameter of the tires.

We would recommend for standard diameters of driving wheel centres for the various sizes of wheels in use under locomotives of standard gauge: 38 in., 44 in., 50 in., 56 in., 62 in. and 66 in.

Your Committee considers it unadvisable to take action in this matter with reference to narrow-gauge locomotives, as there are comparatively few roads of gauge other than standard, and those now in existence are rapidly changing, so that in a few years the railroads of this continent will be, with very few exceptions, of uniform gauge.

We would further recommend that arrangements be made with the Pratt & Whitney Co. or some other reputable manufacturer, to furnish guages for both wheel centres and tires, to railroads, locomotive builders and tire manufacturers, at a reasonable price to be fixed or agreed to by a representative of this Association; to the end that all parties in interest may have absolutely uniform gauge measurements.

Without such uniformity, it will be impossible for manufacturers to furnish tires bored to fit, with certainty that proper shrinkage is allowed.

We believe the requisite allowance for shrinkage to be one one-hundredth part of an inch for each foot of diameter of wheel center.

We have also prepared a drawing of section of tire, which we submit to the convention for consideration.

J. A. LAUDER,
J. JOHANN,
H. W. SPRAGUE,
} Committee.

[This report was adopted as to driving wheel centres and the Committee continued as to standard section of tires.]

IMPROVEMENTS IN LOCOMOTIVE BOILER CONSTRUCTION.

Your Committee on Improvement of Locomotive Boiler Construction respectfully submit the following, as the result of their labors. With a circular of inquiry sufficiently broad to embrace the most minute improvement, and giving admittance to any and all boilers, your Committee regret that very few replies have been received. Mr. J. Davis Barnett furnishes an admirable six-page paper on anthracite and bituminous coal-burning, from an economical point of view.

Mr. J. Snowden Bell furnishes a paper of 30 pages on Improvement in Locomotive Boiler Construction, illustrated with figures 1 to 13 inclusive and plates "A" and "B," with special reference to enlargement of grate area to reach a minimum consumption of fuel, and the utilization of waste or refuse fuel. Both papers are particularly interesting, will repay careful perusal, and your Committee request that they be read before the convention and embodied in their report.

Mr. G. W. Stevens writes your committee that his company has had built by the Schenectady Locomotive Works three 18 by 24 in. cylinder, 5 ft. 6 in. driving wheel, passenger engines, with boiler carrying 180 pounds working pressure. As the engines have only been in service a short time, nothing definite can be said of the benefit of the high steam pressure. No trouble whatever is experienced with the valve and cylinder surfaces, and evidence is given of a fuel record that will not exceed 5 pounds of coal per car-mile, with trains of 10 cars, equal to 280 tons, exclusive of load, running on a schedule time of 37 miles per hour.

Mr. William Woodcock writes that nothing new has occurred in his practice during the past year, but gives sound advice in advocating steel as the best material for boilers, and with the present tendency to larger boilers, better workmanship and abhorrence for that instrument of boiler torture known as the drift-pin.

Mr. Thomas Twombly reports progress in larger boilers and heavier material.

Mr. Johann: Nothing new.

Mr. Allen Cooke expresses a preference for the wagon-top boiler, of sufficient size to warrant plenty of steam.

From the work of N. P. Burgh (on boilers) your Committee reproduce (see figures 662 and 663) a return tube boiler which is not identical but substantially the same as the Coventry boiler, as reported in 18th annual proceedings of this convention; this is not presented as anything new, but to verify the remark by a member at the last annual convention that some devices were presented as new, when in fact they were 30 years old. In connection with this it is interesting to note the different forms of boilers that have appeared from time to time, particularly those of a comparatively early date; they all bear close resemblance, the designers ignoring the principal of direct application of heat, and imagining that heating surface could be sacrificed and the best results obtained by the introduction of any distortion; evidently believing that the efficiency of the boiler was increased just in proportion to the circuitous route of the heat from the fire box to the tube.

Mr. J. E. Jerrold, of the Chicago, Milwaukee & St. Paul, furnishes your Committee with drawings of his curved boiler seam, as applied to longitudinal seams for the purpose of securing maximum strength and avoidance of concentrated strains, and kindly furnishes a letter giving the result of pressure test as applied to steel drums, constructed for the purpose, a plate showing the point of rupture, indicated in red lines. The letter giving method of testing, pressure applied, etc., submitted herewith.

Your Committee conclude that with the return of activity in locomotive building, improvements will become more manifest, and that this association, as in the past, will continue in the collection and dissemination of knowledge which has made the locomotive boiler a triumph of mechanical skill and placed the locomotive in acknowledgment as one of the most economical of high-speed engines.

G. W. STEVENS,
WM. FULLER,
T. J. HATSWELL
} Committee.

THE BEST PLAN OF REMOVING, CLEANING AND RESETTING FLUES.

Your Committee, to whom was referred the subject of "The Best Plan of Removing, Cleaning and Resetting Flues," would report that they issued the following circular of inquiry to all members of the association:

"The undersigned have been appointed as a committee to ascertain the best plan of removing, cleaning and resetting flues, and respectfully solicit answers to the following questions:

"First—What, in your opinion, is the best method of removing flues? Please describe in detail.

"Second—Have you ever removed flues by the aid of a locomotive or other power? If so, please give experience.

"Third—Does the manner in which flues are set affect the plan of removal? If so, how?

"Fourth—What do you consider the most economical and thorough way of cleaning flues after they have been removed from boiler?

"Fifth—What have you found to be the best manner of resetting flues?

"Sixth—What material do you consider the best for flue ends?

"Seventh—Have you found it more satisfactory to weld or to braze ends to flues?

"Eighth—Does the character of the water or fuel used in any way govern the manner of doing above work? If so, please state in what particular?

"As far as possible, please send with your report, drawings or sketches giving dimensions of all special tools or devices.

"That the Committee may be enabled to make as complete a report as possible, and one analyzing the subject under all conditions, they would request members not to confine their reports to direct replies to questions, but give all information obtainable."

We have received answers, all more or less complete, from 12 members, as follows:

Question No. 1—What, in your opinion, is the best method of removing flues? Please describe in detail.

Answer—Four cut-off flues inside of front flue sheet. Two members say they split forward end of flue about 1 in. inside sheet. One member reports that if flues are not badly scaled, his practice is to turn down the bead in fire-box end and drive them out. If scale has formed on them to such an extent as to prevent their removal readily, take out the dry pipe, cut-off flue and inside of fire-box flue sheet, turn down bead on front end, and drive flues into the boiler. Five do not give particulars. Of the whole number, three report using a hook cutter, and two report using a cutter bar to cut off flue ends. Others do not use special tools. Eleven say they take flues out through dry pipe opening, when all are to be taken out, but use one of the tube holes in front flue sheet, enlarged for the purpose, where only a few (30 or 40) flues are to be removed. One member always takes the flues out through an enlarged hole near bottom of front flue sheet.

Question No. 2—Have you ever removed flues by aid of a locomotive or other power? If so, please give experience.

Answer—Mr. Allen Cooke, of the Chicago & Eastern Illinois, says he has removed flues with a locomotive, but does not think it pays.

Mr. Wm. Swanston, of the Chicago, St. Louis & Pittsburgh, has tried to draw flues through the front flue sheet, but without success.

Mr. Jacob Johann, of the Chicago & Atlantic, has used an engine to pull out a few flues, but gave it up for the reason that it strained the flue sheet and ground the holes out of round. A better way, he thinks, when only a few bottom flues are to be taken out, is to ream out one hole, about one-eighth of an inch, and draw the flues with a windlass of two-inch round bar iron, to extend across front end and to rest on two of the front end studs; in each end of this bar should be a 1-in. hole for ⅞ in. lever, in centre of bar to be an eye bolt with chain attached; to use cut bead etc., off both ends of flue, and drive it out 6 in., attach chain, and draw flues out with windlass.

Mr. Wm. Montgomery, of the Philadelphia & Reading, says he never used a locomotive for this purpose, but has witnessed the experiment and considers it very dangerous, on account of liability to break the bridges between holes in flue sheet.

One other member reports using a windlass, but does not describe it.

Question No. 3—Does the manner in which flues are set affect your plan of removal; if so, how?

Answer—Nine members report that the manner in which flues are set does not affect their plan of removal.

Mr. Wm. Montgomery, of the Philadelphia & Reading, says that putting copper ferrules on fire-box end gives some trouble in drawing flues through front flue sheet. He sets the flues in back end with a tool which enlarges the flue and ferrule inside the sheet.

Mr. Jacob Johann says that in using the "Prosser expander" the piece left after cutting off the end is a trifle harder to get out of the way.

Mr. R. C. Blackall, of the D. & H. Canal, reports that flues set with the "Prosser expander" are more difficult to remove than those set with the "Roller expander," on account of shoulder being formed on inside of sheet.

Question No. 4—What do you consider the most economical and thorough way of cleaning flues after they have been removed from the boiler?

Answer—Ten members report the tumbling-barrel as the best means of cleaning flues

Mr. Wm. Swanston reports that for the past 18 months he has been using an Otto flue cleaner, manufactured by the Flanders Machine Co., and regards it as the best appliance, for the purpose, he has seen.

One member scrapes his flues, but has had no experience with any other method.

Mr. T. J. Hatswell, of the Flint & Pere Marquette, tumbles his flues in water.

Mr. J. S. Graham, of the Lake Shore & Michigan Southern, in speaking of tumbler used by that company, says tumbler is made of an old boiler, lengthened to suit, and is run at a speed of 30 revolutions per minute; can clean 45 to 50 flues at a time, in one to two hours. Thinks this form of tumbler especially good, as the rivet heads on inside of sheet find the poor flues by indenting or breaking through the thin spots.

Mr. Jacob Johann thinks a few hard clinkers should be put in with the flues, and the tumbler speeded just fast enough to carry the flues to the top centre, letting them drop before they pass that point; thinks that the drop does the work much more efficiently than the mere rolling of the flues over each other.

Question No. 5—What have you found to be the best manner of resetting flues?

In resetting flues, hardly any two of the members do the work exactly alike, and we give method employed by each.

Answer—Mr. R. C. Blackall says that their practice is to anneal both ends of tube, drive on swedge to take off bur, and compress ends for copper liner, expand with "Prosser tool," bead and calk, then finish lightly with Dudgeon roller.

Mr. W. Woodcock, of the N. J. C. Div., P. & R. Ry., uses the Prosser expander, and thinks it the best, because flues are set out between sheets and form a stay; uses the Dudgeon roller to set flue out to fit sheet, also uses the latter tool for repairs.

Mr. Allen Cooke says drill hole for 2 in. flue, $2\frac{1}{16}$ in., use copper ferrule to bring diameter of hole down to $1\frac{29}{32}$ in., secure ferrule in hole with Prosser expander, swedge flue ends taper for driving fit, expand hot with mandrel to fit flue holes in front end; as fast as flues are driven home, expand with Prosser expander enough to hold in place until all are in, then use expander hard enough to set flue out tight and form collar inside, so that sheet is held between collar and bead; lap flue with ball hammer and bead with heel tool, being careful to always work outward, working flue over copper, and make small bead; use Dudgeon's expander lightly to finish with. Thinks it pays to bead front ends, as flues make a better brace for sheets by doing so.

Mr. T. J. Hatswell uses copper ferrule on fire box end; uses Dudgeon expander, and beats flue over the copper; gives no particulars as to front end.

Mr. C. W. Mills, of the Rochester & Pittsburgh, says set flues and roll with Dudgeon expander. No particulars.

Mr. John Player, of the Central Iowa, reports that the best manner that they have found is to use the copper ferrule and roll or expand with the Dudgeon expander.

Mr. Jacob Johann says he prefers to have the flue holes in back flue sheet a trifle less in diameter than flues, and after grinding the rust off the end of flues with an emery wheel to drive them into place, flue holes in front sheet to be $2\frac{1}{16}$ in. in diameter for 2-in. flues, to allow for light copper ferrule. He says, however, that many of the engines now on that road have flue holes in back sheet $1\frac{3}{4}$ in. in diameter; this necessitates swedging down the back ends of the flues, and the holes are so badly out of round that copper ferrules have to be used in order to make a joint.

Mr. J. S. Graham knows of no better method than rolling front end and rolling and beading back end; he uses a roller turned to the same taper as the spindle, but reversed, so that the large ends of the rollers shall come on the inside of sheet, when used, insuring a joint at that point first.

Mr. Wm. Swanston says the best plan they have tried for doing this work is to bore the holes in flue sheet $\frac{1}{32}$ in. larger in diameter than the flue, swedge or die, the fire-box end of flue down $\frac{1}{32}$ in., and braze on a copper ring; this to be filed off to a driving fit in sheet; on the front end the scale is removed from flue and a light copper ring inserted (but not brazed) between sheet and flue; use the roller expander and bead fire-box end; do not consider it necessary to bead front end

Mr. Wm. Montgomery reports that they have found the best manner of setting flues to be as follows: Swedge down fire-box end $\frac{1}{32}$ in., file the end off bright, and put on a copper thimble to bring flue up to size, set with Dudgeon expander, then use tool to form a groove or enlargement of flue just inside sheet, making a joint next the water; bead flue on outside of sheet. This makes a firm job, and not one likely to be loosened by expansion of the flues.

Mr. Geo. Hackney, of the Atchison, Topeka & Santa Fe, uses copper bushings expanded to fit holes in flue sheet, end of flue to be ground smooth on emery wheel, placed in a position, and expanded with roller, only fire-box end beaded.

Mr. G. W. Stevens, of the Lake Shore & Michigan Southern, expands with roller and flanges with thumb tool.

Question No. 6—What material do you consider the best for flue ends?

Answer—Nine members say that they consider good soft iron the best material for flue ends.

Two use semi-steel.

Mr. T. J. Hatswell says, use ends of the same material as the body of flues.

Mr. Montgomery says that he thinks that it will pay to put ends of good charcoal iron on new flues.

Mr. W. Swanston reports having tried flue ends of steel and semi-steel, but without much success.

Question No. 7—Have you found it more satisfactory to weld or to braze ends to flues.

Answer—Eleven members report in favor of welding ends to flues.

Mr. Jacob Johann says either welding or brazing can be made satisfactory, and he thinks there is little difference between the two methods; says he knows from actual experience that when fitted up, with special tools for cutting off, scarfing, and brazing, that the brazing can be done much cheaper than welding, and always insures a straight flue; in brazing much cheaper labor can be employed than in welding. The first cost of fitting up for brazing would be greater than for welding, but thinks that the difference in cost of doing the work would more than offset this. More flues can be brazed than welded per day, with a given number of men. A description of special tools used by him for brazing is now in possession of your Association.

Mr. W. Swanston says: We only resort to brazing when flues are of so poor a quality as to give trouble in welding.

Question No. 8—Does the character of the water or fuel used in any way govern the manner of doing the above work? If so, please state in what particulars.

Answer—Eight members report that neither water nor fuel materially affect the manner of setting flues.

Mr. Wm. Swanston thinks, with good soft water, it would not be necessary to use copper rings, and that as good results would be obtained by setting flues iron to iron, but with water of that section, copper is a decided improvement.

Mr. Jacob Johann thinks that flues tight with one kind of water and fuel will be tight with another, but thinks that they may make a decided difference in the length of time flues remain tight. Says the softer and freer from sediment the water is, and the more free from sulphur the coal is, the longer the flues will last; thinks also that the length of time that the flues will last depends materially on the engineer.

Mr. Montgomery says that they use the same engines for both hard and soft coal, and he does not see any especial difference but that the beads on bottom flues burn off faster with hard than with soft coal. Uses, in some cases, cast iron ferrules, which he thinks are an advantage. Does not think that the quality of water affects the method of setting.

Mr. W. Woodcock uses a "Saddlers'" patent flue welding machine. The weld is made by revolving rolls, and is a very simple and effective machine.

Mr. Allen Cooke sends sketch of crimping tool, which find attached.

Mr. T. J. Hatswell sends blue print of "Hawks Bill" for cutting off flues, which please find attached, he also gives price of taking out welding and resetting one flue by hand at 17 cents.

From the reports furnished, and from our own experience, we have reached the following conclusions:

First—The best known method of removing flues is to use a cutter bar, to cut off flues inside of front flue sheet, and turn down bead on back end, when all flues are to be taken out, take out dry pipe and take out through dry pipe opening; when only a few flues are to be removed, use one of the tube holes in front of flue sheet, enlarged for the purpose.

Second—Taking all of the circumstances of the case into consideration, do not consider it advantageous or economical to use locomotive or windlass to remove flues.

Third—The manner in which flues are set does somewhat affect the plan of removal, but in consideration of the great importance of having flues set to give the most efficient service in practice, do not think the difference enough to be considered a factor.

Fourth—Consider the tumbling barrel as the best known means of cleaning flues.

Fifth—Know of no better method than rolling front end and rolling and beading back end; use copper ferrule expanded to fit holes in flue. Flue to be placed in position and expanded with roller; do not consider it necessary to bead front end.

Sixth—Consider good soft iron the best for flue ends.

Seventh—Have had no trouble from either brazed or welded flues; with proper flue welder, have every reason to believe welding is cheaper.

Eighth—Would recommend manner of setting as explained above for all kinds of water or fuel.

Your committee have not received or prepared drawings of flue welders or other special tools, but feel assured it would prove of great advantage to have such gotten up, and that the above subject deserves further investigation by the members of this association. Respectfully,

CLEM. HACKNEY, Chairman.

SHOP TOOLS AND MACHINERY.

Your Committee on Shop Tools and Machinery beg to here with submit the following report. By dealing with but one subject the Committee hoped to gather more valuable and accurate information than would likely be obtained if an attempt were made to cover a larger and wider field. They accordingly caused to be issued for distribution the following circular:

"Please state if you have used milling machines instead of planers for surfacing work. State kind of work surfaced, and difference of time in favor of either machine.

"It is not necessary to give the number of hours occupied by a machine in performing a certain amount of work; the result, if given in form of a percentage in favor of one or the other machines, will answer quite as well, the object being simply to ascertain which is the cheaper method, and to what extent."

Replies to this circular were received from ten members, five of whom reported more or less experience with milling machinery.

Mr. J. Davis Barnett believes that the value of milling begins and ends with small surfaces; that when large surfaces are to be dealt with the expense of keeping up cutters runs away with all the profit.

Mr. Jacob Johann considers the milling machine as the equivalent of half a dozen special machines, and is decidedly in favor of special machinery.

Mr. A. M. White thinks there is a gain of 10 to 20 per cent. in favor of milling, where the work is of such shape that the cutters can work freely.

Mr. H. N. Sprague has milled rod-boxes successfully for several years at a much less cost than planing, but is of the opinion that the great cost of cutters for other work neutralizes what advantage the milling machine may have over the planer.

Another member writes that in the establishment with which he is connected milling is almost the only method used for finishing the strap fits of rod boxes. The bottom, sides and ends of flanges are surfaced at one cut as accurately as can be done by an expert on a planer, and at about half the cost for labor, the same help having been transferred from the planer to the milling machine.

He considers the milling machine as possessing advantages over the planer for surfacing many kinds of both large and small work. When cutters of any considerable size are to be used he thinks they should be made with inserted and adjustable teeth; that is, the teeth should be held in an iron or steel head, as this admits of easily replacing them when they become broken or badly worn.

Those who believe that only small work can be advantageously surfaced by the milling process, he refers to the huge milling machines known as the rotary planers, so successfully used by bridge and roof builders for finishing ends of chords, posts and other members of structural work. Here is milling on a large scale, a cast or wrought-iron head in which are held many cutters similar to those of the lathe and planer, simple, cheap and effective, a machine capable of surfacing work 48 in. in width, and of indefinite length, with such rapidity and accuracy that the planer ceases to be a competitor, and he thinks it fair to assume that a similar machine would back off cylinders as quickly and as accurately as it does the work upon which it is commonly engaged.

This member is also of the opinion that the common idea that large milling tools are too expensive to be of practical value is not well founded. Large milling cutters, if fitted with inserted teeth, are not more expensive to keep up than a given number of lathe and planer tools of similar dimensions.

If, however, large cutters have to be made from the solid, thus giving the tool dresser an opportunity to undo the machinists' labor of days and perhaps weeks, we are dealing with unsafe methods rather than with wrong principles; with such cutters the rotary planer would surely become a complete failure as a labor saver; therefore, they who attempt to do any considerable amount of milling with large solid cutters are not likely to become converts to this method of surfacing work. But with the well-designed milling machine and properly constructed cutters, he believes the question of milling and planing will in very many cases be decided in favor of the former machine.

D. A. WIGHTMAN,
A. J. PITKIN, } Committee.
F. B. MILES,

HAMMER BLOW OF LOCOMOTIVES.

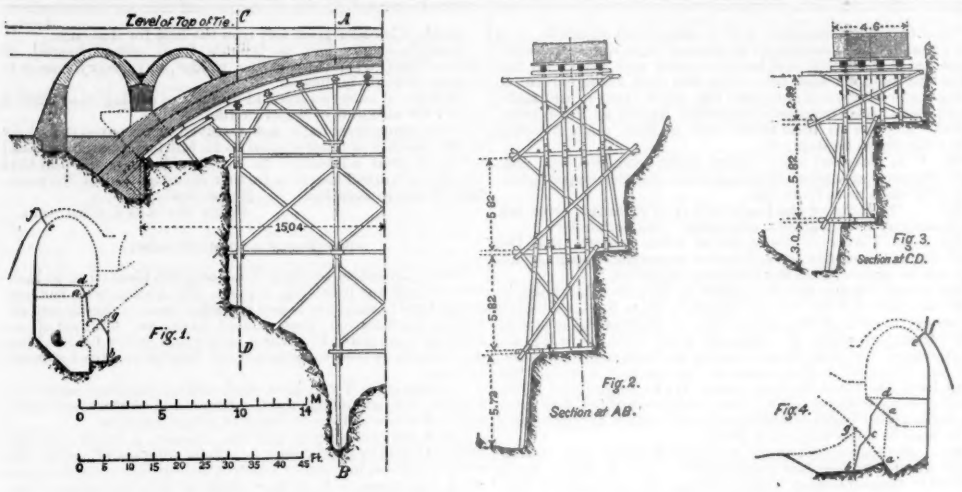
The Committee on this subject (Wm. Woodcock, F. W. Dean, Angus Sinclair, T. L. Chapman and Coleman Chapman) reported that a number of meetings had been held with the Joint Committee appointed by the Franklin Institute, consisting of Messrs. Thomas Shaw, S. W. Robinson, P. H. Dudley, Theodore N. Ely and Edward Longstreth. It was originally intended that a test of this subject would be made at the Novelties Exhibition held in Philadelphia during the month of September, 1885. It was, however, found to be impracticable to make such test at that time. The report of the Joint Committee is as follows:

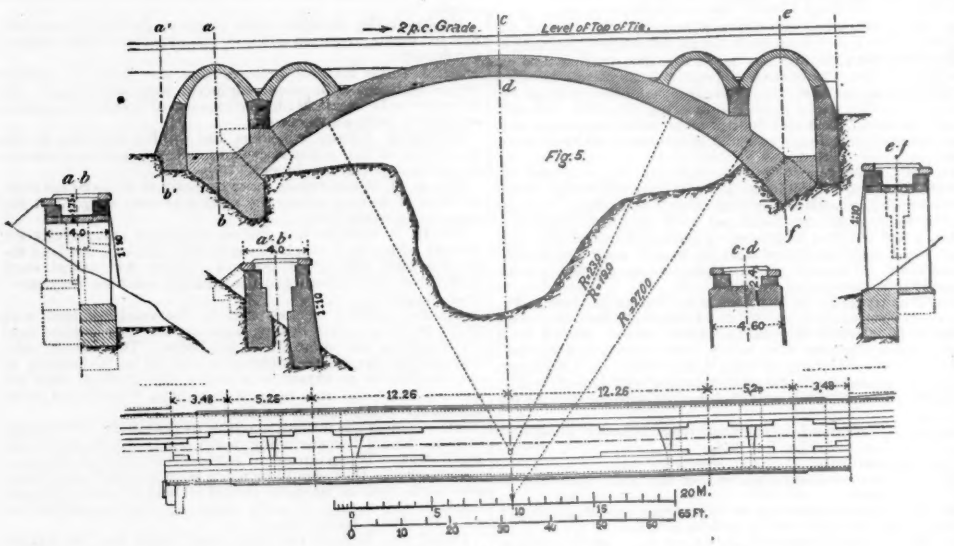
We respectfully report that your Committee has held meetings from time to time, extending over a period of eight months, and have written to and kept posted any absent members of our Committee, in order that all members of said Committee could have a correct understanding of our work and give written suggestions where their presence was impracticable.

Our Committee being composed of professional men, on active duty in different portions of the United States, it was possible to assemble only one-half of its members at any one time.

The work of our Committee, though of a seeming simple character, was in a measure problematic, and in a direction that has occasioned much diversity of opinion among leading engineers and scientists, many of whom contend that there is no wave force, or so-called hammer blow, from imperfect balancing, etc., and some of our master mechanics maintain that their locomotive driving wheels are in perfect balance, etc.

It is, however, self-evident upon careful observation, that, to balance any vibrating weight moving in a horizontal plane, by counter weights in the crank wheel moving in a vertical plane of rotation, that wherever the balance is made perfect in the horizontal direction it is out of balance in the crank wheel in a vertical direction equal to a large portion of the counter weight employed to correct the horizontal





FALL OF A BÉTON ARCH.

movement. In view of this fact, we find that engines considered most perfectly balanced by counter weights in the crank wheel do occasion great disturbance in a vertical direction (causing a wave force that may be compared to a hammer blow), that has a measure of destructiveness upon rails and bridges dependent on weight and velocity of moving parts, and that it is worthy of the most careful examination and test. The forces induced on both sides of the engine, from this cause, are of a complex character, varying greatly, under modifying conditions that occur in practice, that does not submit readily to calculation.

We deem a test of this peculiar action of such importance that we recommend that it be subjected to accurate measurement by means of a special dynamometer that your Committee has specially devised, and which we believe is competent for the purpose. We believe also that it will give a correct showing of the complicated and destructive force complained of, and show its exact value, which test may be regarded as causing the application of such remedies as may hereafter be provided to correct any evident damage in the direction referred to.

A description of the proposed dynamometer is hereto annexed, the cost of which, erected in place exclusive of ground, but covered by a frame building, is estimated to be $6,000. Your Committee having performed their services gratuitously, are not expected, of course, to provide the ways and means to procure the proposed test apparatus.

It has been suggested, however, that since the advantage of any test would be with the railroad companies, that possibly these companies would unite in providing the needful apparatus, and that in case it was provided as described, the Franklin Institute might be intrusted with the charge and possible ownership of the same for the use of all railroad companies.

The above estimate includes the expense of Prof. P. H. Dudley's recording apparatus.

THOMAS SHAW, M. E., Chairman.
F. W. DEAN, Secretary.
} Joint Committee.

Fall of a Beton Arch.

The fall of a béton arch of 98.4 ft. span in February, 1885, is described circumstantially in the Swiss *Bauzeitung*, with illustrations, which we reproduce. The bridge was on the Piræus & Corinth Railroad, in Greece, where concrete has been used very largely for culverts, bridge abutments and arches, more than 70 arches from 2 to 10 metres in span being in use on that road.

The usual composition of the concrete on these structures is 1 of cement, 3 of sand and 6 of broken stone, the latter being less than 2 in. in greatest dimension. The cement used was Desiré Michel's Portland—mortar of which and three parts of sand stood, according to tensile tests taken after 42 days, 227 lbs. per square inch.

The cement of the same make first furnished for the bridge in question gave such inferior results that it was condemned.

After receipt of a consignment that tested up to the usual standard and quite uniformly, the structure was begun, but with concrete proportions of 1 : 2 : 4, instead of the usual 1 : 3 : 6.

Information was had after beginning that part of the same consignment had not acted well elsewhere.

The arch was segmental, with a rise of 1 to 5.3, the spring, however, being at a different level on the two sides. The maximum pressure it was calculated to receive was 227 lbs. per square inch, and the line of pressure fell inside the centre third of the arch width. The spandril was lightened by putting an arched opening through it.

A crack occurred at the spring of the arch at *a*, *a*, fig. 4, just after beginning the arch portion, owing to bad workmanship in the centre. This was, however, repaired by building up béton outside the abutment, practically raising the spring line to the same level on both sides, and no further cracks appeared at this point.

The faces of the arch were plastered after completion of the same in order to show more distinctly any cracks arising during the building of the spandril arches and filling. None such were observed, and 69 days after completion of the arch the centre was gradually struck. By the time the last wedges were removed the crown had settled 2 mm. (0.04 in.), the abutment showing no change nor cracks, nor did the latter yield or give way during the final collapse.

Immediately after the removal of the last wedges, a small, longitudinal crack (*a b*, fig. 3) developed at the point where the streamward abutment of the superposed arch rested on the span. This was merely in the exterior arch face—on both sides, however—and was not thought important; but soon afterwards the cross-cracks *c d*, *e f*, *g h*, made their appearance, reaching into the body of the arch.

Further observation was suspended by darkness until next day. On resumption of work, the cracks were found slightly enlarged, and had extended into the abutments of the small arch.

The engineer still regarded the cracks as unimportant, and proceeded to take out the centring. Just as the last row of posts was being taken out the collapse took place, in a very rapid manner, announcing itself just beforehand by the fall of fragments of the plaster which had been applied to the arch faces. The engineer in charge and a laborer were caught by the falling fragments, and the latter considerably injured.

The investigation of the fragments showed that along with portions which were very hard other portions were found which were still soft and incapable of much resistance. These specimens gave no greater resistance than mortar seven days old, or of the same cement of good quality.

The result was obviously due to bad material in a lot from which samples had tested well. The moral seems to be that for such structures every barrel must be tested to assure the safety of the work.

Bridge Vibrations Under Passing Trains.

Advance sheets of the forthcoming report of the Railroad Commissioner of Ohio contain a record of some interesting observations on the vibration of railroad bridges made by Prof. S. W. Robinson. We reproduce a series of six diagrams taken from the same bridge, showing the vertical and lateral vibrations of the panel point nearest the middle of its lower chord during the entire passage of the train. The diagrams are certainly of great interest.

Of the various lines on the diagram the upper one, *A B*, shows the vertical movements, and the lower one, *M N*, the lateral movements. The lower one, *X Y*, is a line of reference. As a train approached the indicator was started, making the straight lines to the left of *A*, *M* and *X*. As the train struck the bridge lateral motion of the pencils began, and it will be seen that in all cases the deflection was greatest within a second or two after the locomotive had entered upon the bridge, or about when the whole of the engine and tender was fairly on the bridge, and long before it had reached even the middle point of the bridge.

The depression of the diagrams, which immediately follows, showing a reaction from this extreme depression, indicates clearly that the latter is a dynamic effect, the sudden depression caused by the entrance of the load setting the bridge in motion downward so quickly that its momentum carries it down far below what even much greater static strains are able to maintain. It is probable that bridges of longer span and greater weight would show this effect much less markedly.

We have added to the diagrams a line showing the length of train and also a scale (on the right line between *A* and *B*) on which the revolutions of the drivers are indicated. The omission of this line from the diagrams is singular, for its indications are certainly very instructive, as may be seen, thus:

The salient feature of the diagrams is that at certain points, which differed with each train, the impact effects, whatever they were, appear to have been synchronous with the natural period of vibration of the bridge, and at others not, causing vibrations of great amplitude and regularity in the first case and not in the second.

Now, to see what effect the drivers probably had, connect any one of the jagged points near the centre of a period of great vibration with the point on the scale of revolutions immediately below it. Connect each second point of vibration with the next point on the scale in each direction until the point where cumulative vibrations began has been passed.

It will be found that in every instance the vibrations of greatest magnitude are almost exactly synchronous with the drivers' revolutions, but as the vibrations decrease they become less so, and when the vibrations become a mere wavy line there is no observable connection whatever.

In a measure the same is true of the lateral vibrations, the most convincing examples being at each end of No. 137 and the right half of No. 164. As a whole, the diagrams seem to connect the vibrations with the revolutions of the drivers very convincingly.

The "length of train," of course, has no connection with its actual length, any more than the diagrams have with the length of the bridge. It simply represents to scale the time in seconds taken by the train to move its own length, which, of course, should nearly correspond with the length of the diagram.

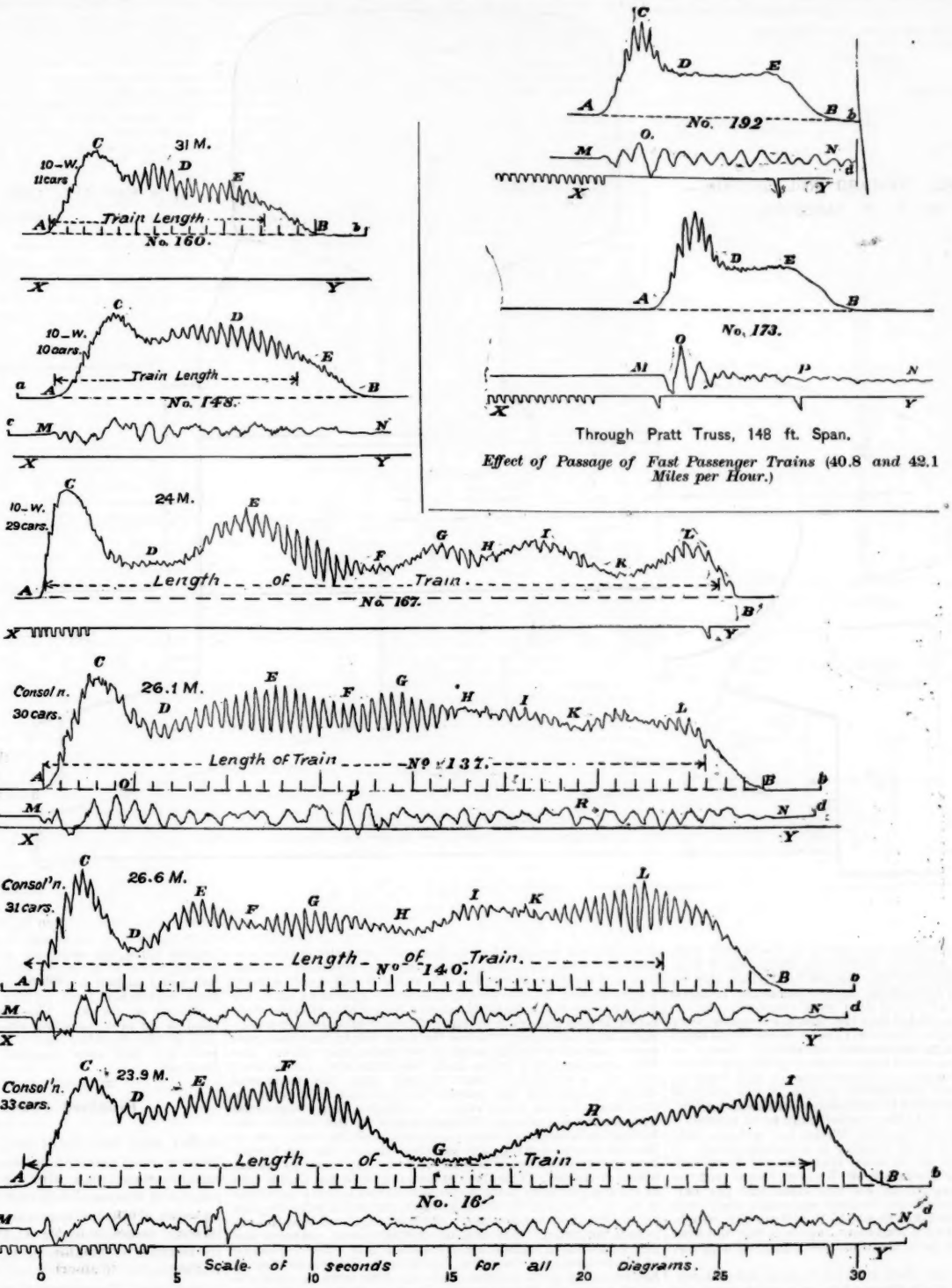
The indicator by which these diagrams were taken consisted simply of a heavy eight-day brass clock movement, from which the escapement was removed and a small centrifugal governor substituted, with a spring to counteract centrifugal force, and arranged so that, for a given position of the governor weights, pads were pressed against a disc, causing friction to absorb excess of driving power. A drum attached to the clockwork carried a slip of paper, on which bore two pencils, so arranged as to move lengthwise of the drum, all being mounted on a base-board and portable. In use the whole is clamped firmly to a staging brought up from the bed below, cords moving the pencils being tied to the bridge in such way as to exaggerate the actual movement about 50 per cent. The diagrams as here engraved exaggerate it one-sixth.

The difference in the effect of passenger and freight trains, or of different construction and speed, as shown by comparing Nos. 192 and 173 with Nos. 160 and 148, is very noticeable and curious.

The cause assigned in the report for the vibrations is described to be "as startling as it was unanticipated, the cause being a combination of circumstances, including speed of train, car-length, panel length, time of vibration of loaded bridge, rigidity of bridge flooring, etc. *Besides this cause* [italics ours] of cumulative vibration, the anticipated one due to unbalanced drivers found confirmation." We have been unable to accept as trustworthy the extended demonstration by which the observed phenomena are connected in a definite mathematical way with variations in these several conditions, the mass of evidence appearing too small to attempt this with profit, although no doubt each has its effect. We therefore omit further summary of that part of the paper, which may be consulted in the report.

This certainly opens a profitable field for investigation, but a still more interesting and profitable one is to use appliances which directly measure the extensions of the metal, and hence the strains during the passage of a train by a "strain indicator" clamped to the parts to be tested. A new instrument of this kind is described by Mr. C. E. Stromeyer, in a paper read before the Institution of Naval Architects,* which gives some diagrams of strains in bridges which show similar peculiarities to those here given, except that the impact effect

* Reprinted in *Engineering*, April 30, 1886.



VIBRATIONS PRODUCED IN THE SAME BRIDGE BY THE PASSAGE OF VARIOUS FREIGHT TRAINS AT VARIOUS SPEEDS

Vertical Scale One-Sixth More than Actual Movement.

Through Pratt Truss, 148 ft. Span.

Effect of Passage of Fast Passenger Trains (40.8 *and* 42.1 *Miles per Hour.*)

[*Through Pratt Truss Bridge, New York, Pennsylvania & Ohio Railroad, near Leavittsburg, O., 141 ft. Span, 24 ft. deep, 9 Panels, 15 ft. 8 in. each. Kind of engine and train and speed given in each diagram. The scale below "Length of Train" shows the revolutions of the drivers.*]

on the first entrance of the train to the bridge is absent, in part, no doubt, because the span of the bridge was greater (some 230 ft.) and its dead weight enormously greater, the span tested (Hamburg bridge) having been a double parabolic truss nearly 100 ft. deep in the centre. In only one of the diagrams, however, did the indicated strain rise gradually from the time the engine entered on the bridge until it was upon the point of leaving it, as it ought. In this case, the indicated strain for an engine weighing, with tender, only 76,500 lbs. and a train weighing only some 800 lbs. per ft., caused a strain of over 11,000 lbs. per square inch. Most railroads probably would feel well repaid by getting or making an instrument of this kind and keeping a competent man at work for some months in measuring the strains which their bridges actually sustain in service.

The New York State Car Coupler Trial.

The Railroad Commissioners of the state of New York held a test of car-couplers at Albany, on June 16 and 17. The proceedings on the first day's trial have already been reported in the *Gazette* with the exception of the results obtained from the trials of the Fennell and Dowling, which are given below.

The trials on both days took place under similar conditions with one important exception. On the first day each coupler was set to couple with a standard link in a common drawbar some 2½ in. below the standard height. As the drawbar selected had an open throat, the link could be driven back when struck, and practically none of the couplers could effect a coupling with a link of standard length. Three, the Aikman, Ames and Thurber, effected a coupling with links slightly over the standard length. The proceedings on the first day thus showed that under certain conditions cars must be coupled by hand. On the second day, however, a totally different common drawhead was used. The variation in height was less and the link could not be driven back. The result was that with the exception of the Perry, every coupler using a link coupled automatically with the link in the common drawhead. It seems a great pity that the trial was not conducted with the same common drawhead on the two days. The use of the two different drawbars renders any fair comparison impossible.

As usual, the question of length of link had an important bearing on the success or failure of the attempts to couple. The Smillie coupler made a failure with what was supposed to be a standard link, but the writer on measuring found it about $\frac{1}{16}$ in. short of the standard length. Unfortunately, the Master Car-Builders' Association has never definitely adopted a standard link, and both at the Buffalo trials in September, 1885, and at the Albany trials, the difficulty experienced in coupling was often ascribed to a misunderstanding as to the exact dimensions which a standard link should possess. A clear length inside of 10½ in. and a width inside of 1⅝ in. are, however, very generally recognized as standard dimensions, the link being composed of 1¼ in. iron, D section. On the Erie, however, the standard link is 11⅜ in. by 1⅝ in. inside measurements, and on other lines 2 in. is regarded as the proper inside width. It is obvious that a coupler made to couple with a 2 in. link could have a dog or pin 1⅜ in. wide, and that such a coupler would not take an Erie link only 1⅝ in. wide. At Albany, however, the principal difficulty was as regards the length rather than the width of the link, and probably many of the couplers would have done better with a longer link.

The following table shows how the remainder of the couplers tried underwent the tests.*

The tests made were as follows:

1. Coupling with its own kind at slow speed.
2. " " " quick "
3. Set not to couple with its own kind.
4. Uncoupling from its own kind with ease.
5. Coupling automatically with a standard link in a common drawbar.

* Particulars of the first day's proceedings, giving particulars of the trials of nearly twenty couplers, will be found at page 420, *Railroad Gazette*, June 18, 1886.

Omitting the last test for the reasons explained above, the results obtained were as follows:

Coupler.	No. of Test. 1	2	3	4	Where used.
Archer	Yes	No	Yes	Yes	Delaware & Hudson
Barr	Yes	Yes	Yes	Yes	Lehigh Valley
Dowling*	Yes	Yes	Yes	Yes	P'gh., Cin. & St. Louis
Fennell	Yes	Yes	Yes	Yes	Skaneateles
Hien	Yes	Yes	Yes	Yes	Housatonic
Hoag	Yes	Yes	Yes	Yes	Boston & Albany
Keeler	Yes	Yes	Yes	Yes	new
Kilmer	Yes	Yes	Yes	Yes	new
Kiltonbeck	Yes	Yes	Yes	Yes	new
Perry	Yes	....	Yes	Yes	Buffalo, N. Y. & Phila.
Powell	Yes	....	Yes	Yes	Kansas, Fort Scott & Gulf
Robinson	Yes	Yes	Yes	Yes	Fitchburg
Titus & Bossinger	Yes	Yes	Yes	Yes	Chesapeake & Ohio
Whitman	Yes	Yes	Yes	Yes	Lehigh Valley

* In the record of tests on page 420 of the *Railroad Gazette*, owing to a typographical error, none were recorded opposite the Dowling. The results are given above.

The following notes as to these couplers may be interesting.

Several of the couplers in the above list are little known and have not been exhibited in their present form at any previous public trial, though the Fennell, the Powell and possibly one or two others, have been in use for several months. The new couplers are the Barr, Fennell, Hoag, Keeler, Kilmer Kiltonbeck, Powell and Robinson. The Whitman coupler is little known, but was tried at Buffalo by the Executive Committee of the Master Car-Builders' Association, in September, 1885.

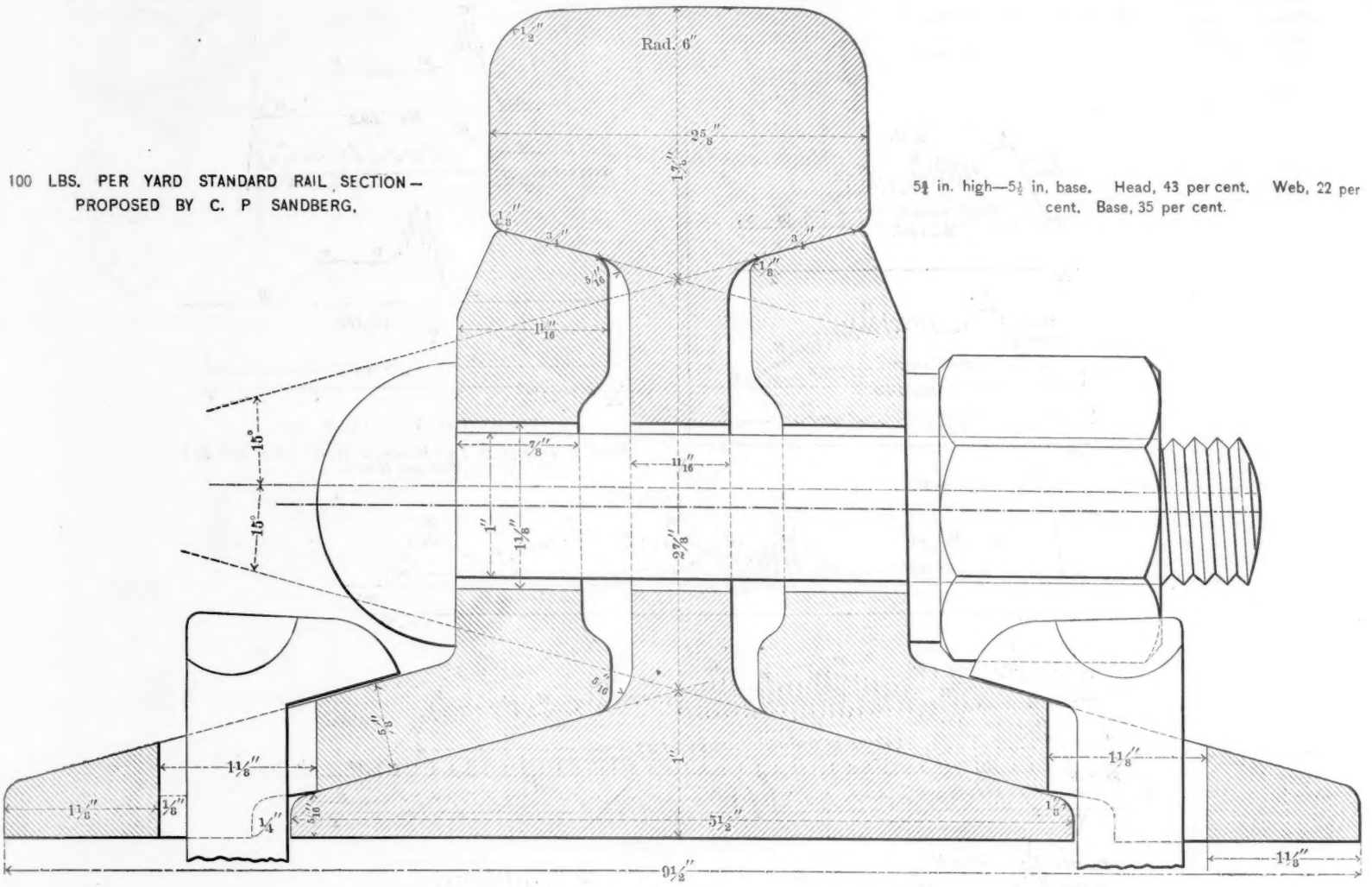
The Barnes coupler shown at Albany was totally different to that shown at Buffalo, and changes had been made in the McKeen and other couplers.

Of the 42 couplers tried at Buffalo, only the following 16 were represented at Albany:

*Ames.	*Dowling.	Perry.
*Archer.	Hien.	Smillie.
Boston.	*Janney.	*Thurmond.
Cowell.	*Marks.	Titus & Bossinger.
Curtis & Wood.	*McKeen.	United States.
		Whitman.

100 LBS. PER YARD STANDARD RAIL SECTION—PROPOSED BY C. P SANDBERG.

5¾ in. high—5½ in. base. Head, 43 per cent. Web, 22 per cent. Base, 35 per cent.



Those which the Executive Committee of the Master Car-Builder's Association reported at Niagara Falls June 8 were most worthy of further trial are marked *. [After this report was received the convention, after discussion, resolved to order further special trial of the Cowell coupler.]

It is somewhat remarkable that the Blocker coupler, very lately approved of by the Railroad Commissioner of the State of Michigan, was not represented at either Albany or Niagara Falls, as far as could be ascertained by diligent search and inquiry. The Hilliard, a coupler having a hook rotating in a vertical plane, was also absent, though it has received the approval of the Railroad Commissioners of Massachusetts.

The following notes as to the couplers may be of interest:

ARCHER. This coupler, like the Marks, has a loose link, held by a sort of long hook rotating in a vertical plane. It was stated to cost only $3.50 more than the old drawhead. Mr. Blackall, of the Delaware & Hudson, states that the common coupler complete on his line costs $27 per car. Though many of the couplers tried had expensive steel castings, their cost was stated at from $10 to $12 per car, which, in view of Mr. Blackall's statement, appears far too low. All statements of cost have, therefore, been omitted with few exceptions.

If the hook breaks, the whole drawhead can be taken down. When set to couple with its own kind at a quick speed, the link struck the lower lip of the other drawhead and was bent, exciting considerable surprise among the spectators. This coupler has been used on the Delaware & Hudson for some time.

BARR. This coupler is of the loose link type, a dog swinging from above supporting the pin. This coupler has been very recently introduced.

FENNELL. This coupler has a species of massive link rotating in a vertical plane above the drawhead, and engaging with a suitable lug or crotch on the upper surface of the drawhead. Each link weighs 75 lbs., and in the latest arrangement the lower link effects the coupling and the upper rides on it, and the combined weight, 150 lbs., prevents the links rising sufficiently to permit the cars to come uncoupled during a journey. This coupler has been in use on the Skaneateles Railroad for some time, and as that line has very sharp curves and heavy gradients, it has been subjected to severe tests. The inventor, Mr. Fennell, is the Master Mechanic of that line.

HIEN. This vertical plane coupler has been before the public for several years. Mr. Opdike informed the Commissioners "that 170 of these couplers had been in use on the New Haven & Northampton for two years. Five or six hooks and hingepins have broken during that time, but the locking gear has given no trouble, and 41 couplers of the latest pattern have done well." Both heads have to be opened to couple or uncouple. The inventor considers this necessary in order that when run together set not to couple, the heads may strike fair and square without any tendency to pass one another. This coupler will not couple automatically with any other. One pull at the handle and letting go uncouples, but it is impossible to tell from inspection whether two cars are coupled or uncoupled. It is set not to couple by going between the cars.

A car fitted with this drawhead was set not to couple and then driven sharply against a Safford drawhead, in order to ascertain if they would interlock, but nothing of the kind occurred, the result being satisfactory.

HOAG. This coupler was tried before the Massachusetts Commissioners in 1884. It is of the loose link and pin type. The pin is supported by a long steel casting of somewhat peculiar shape.

KILMER. This new coupler is of the loose link type, with a dog of peculiar shape, somewhat resembling that used in the Gifford.

KILTONBECK. This coupler is of very recent invention, and differs in a very important respect from any coupler exhibited. The main idea of the coupler is good and mechanical, and ingeniously worked out, and if it will stand a hard practical test of use during a winter, exposed to snow, ice and cinders, would possibly prove a formidable rival to some better known loose-link couplers. The inventor frankly recognizes that all links are not of the same height, and therefore uses a coupler with four mouths, one under the other. The idea was probably taken from the drawhead on the back end of a switcher, but in this case the horizontal divisions between the mouths are not cast solid with the drawhead, but are free to move vertically, being supported by spiral brass springs. When a link is in the coupler, the bottom rests on one of these partitions, and the back end of the link is kept down by the partition above. The link is thus kept nearly level, but is free to yield to any vertical movements of the car. The vertical distance from the under side of the top partition to the upper side of the bottom partition is 7½ in. Each of the three movable partitions is free to play vertically, but cannot move horizontally, and thus the pin is well supported. The dog, or striking piece, supports the pin, which has a shallow groove turned in it. The ingenuity of the coupler attracts notice, but it is to be feared that it has too many parts and too much machine work to stand the rough usage of a freight train. If handled by a careful man, it might do well on a switching engine.

PERRY. This loose-link coupler is well known, and has been illustrated in the *Gazette*. It is in use on a great number of roads, including the Fitchburg, the Housatonic, the Chicago & Eastern Illinois, the Milwaukee & Northern, the St. Paul, Minneapolis & Manitoba, and others.

POWELL. This coupler attracted considerable attention, owing to the ingenious way in which it was designed, and the excellence of the castings of which it was made. The inventor took it completely apart in a few seconds, in order to show the Commissioners that it had no machine work about it, and that the parts were held together without any bolts, nuts or springs. The coupler was very easily uncoupled either by hand or foot, without taking up the slack. It was pointed out, however, that a suspicion of grease on the pin might have facilitated the working of the coupler, but this was denied by the inventor.

A loose link is used, and the dog supporting the pin resembles a pinion with four teeth. The pin, like the rest of the coupler, was cast steel, the head being an excellent likeness of John L. Sullivan when smiling. A link controller to elevate or depress the link when coupling is used. The whole coupler, including the handles for working, is very ingeniously and carefully designed. It has been used for 11 months on 20 cars on the Kansas City, Fort Scott & Gulf.

ROBINSON. This coupler has a loose link, and a dog or curved pin, and a link controller.

TITUS & BOSSINGER. This coupler was tried at Buffalo in September, 1885, and was afterward fully illustrated in the *Railroad Gazette*. It is a vertical plane coupler of the Miller type, with a hinge head. It will couple with the heads either open or closed. It will couple with the Miller, but not with the Janney. One advantage claimed is that the draft is on the centre line.

One of the cars fitted was driven sharply against a car fitted with a Safford drawbar. The Titus & Bossinger head passed the other on one side. This would, however, not have taken place if double dead-blocks had been used on both cars. The importance of double dead-blocks as a safety attachment could hardly have received a better demonstration. This coupler has been in use for some time on the Chesapeake & Ohio.

WHITMAN. This coupler uses a loose link and a dog supporting a special form of pin, a cross-bar being secured to the back of a common pin. This cross-bar keeps the back end of the link down, and so forms a link controller. If the pin is slightly lifted, the front end of the link is lowered. The pin is supported by a spring plunger, which also prevents the link being pushed too far back. The coupler has been used since September, 1885, on 3 or 4 cars on the Lehigh Valley.

WOODS & DRAKE. The break-down of this coupler (noticed in our previous issue) was caused by the fracture of the key in the drawbar bolt. The inventors state that after a new key had been inserted, the coupler worked satisfactorily.

Proposed 100-lb. Rail Section.

Rather with the idea of doing missionary service by familiarizing every one with the idea that heavier as well as better rails are needed than with the expectation that any large number of companies will rush off to get it rolled, we present herewith a full-size engraving of a section which has been recently proposed by Mr. C. P. Sandberg in a paper before the Institute of Civil Engineers, supplementary to that which was published in the *Railroad Gazette* of Feb. 12, 19 and 26 of this year. The contrast in the size of this rail and ordinary sizes is not realized at the first glance because all its parts are symmetrical, but it will be realized by remembering that an ordinary 60-lb. rail will barely reach to the under side of the head of this section, and that the base is wider than the ordinary base and angle-bar combined.

It has been objected to such very heavy sections that there is danger of the same anvil-like effect which drove stone ties out of use, but we think there is very little in this objection. Probably a rail might be rolled too heavy, but it does not yet appear that they ever have been. The first essential, of course, with so heavy a section as this is to have some greater certainty of quality than is now common, but that granted, there are probably localities even now where even so heavy a section as this would be true economy, and many thousand miles where a compromise between it and what they are now using would be true economy.

Of the total weight of this rail there is in the

Head	43 per cent.
Web	22 "
Base	35 "

Mr. Sandberg discusses it, and the general question of rail sections and joints, as follows, many of the details of his argument being rather more than questionable, as for instance the allowance for the "equalized" weight of the English chair, the assumption that his mileage record between shop repairs is in any way remarkable, and the figures given for increase in weight of rolling stock, but the general purport of the argument is much to the point:

Weak Rail-joints and Light Rails.—Why do rail-joints break? Because they are not strong enough, was the answer of a correspondent of the *Railroad Gazette*. And why do rails wear out so soon? Because they are too light. These simple explanations were as near the truth as they could be, and had only the fault of being too simple. Science was therefore called upon to make other suggestions, but, not-

* "The Railroad Gazette," 188, vol. xviii., p. 194.

withstanding, the result will be the same—namely, that rail-joints break largely, and rails wear badly* In Europe affairs have not arrived at such a critical state, but they are in a fair way of approaching it. Admitting that in Europe as well as in America the flange-rail is the cheapest and best for a new country, it must, on the other hand, be granted that since the traffic has developed on certain main lines for international through traffic so as to be tripled, and the rolling-stock has accordingly been augmented in weight and the speed increased, the permanent way should be strength-ened in proportion. This is just what is needed, and a calculation will now be made whether it would not be economical to adopt a stronger permanent way for these portions, removing the lighter rails for service on the branches with lighter traffic. It was stated by Mr. B. Baker, M. Inst. C.E., in his address last year before the British Association, that many repeated changes of loads on a structure must try the material very much more than a constant stress, and even very light stresses, if repeated many million times, will cause breakage. Hence the results of single tests on rails are not at all comparable with the cases in which millions of trains pass over the rails. Suppose, for instance, that a rail can carry 30 tons in one test, it may yet break with a weight of only 5 tons after millions of repeated charges. The fact should further be taken into account that the sleepers are by no means fixed supports, but press down in the ballast if the rail is weak, so as to spring under the load. With reference to this remark it is pointed out in the *Railroad Gazette* that want of weight of rail in America is counterbalanced by the sleepers being generally laid 2 ft. apart instead of 3 ft., as in Europe. It must be admitted that this is to a certain extent of some value in favor of the American light rails; but after all it carries very little weight in practice, inasmuch as the light rail will bend and dislocate the sleeper and the ballast. Another method, by which American railway engineers have attempted to lessen the effect of disproportionately heavy rolliing stock upon light rails, is to divide the weight of the engine among many axles and wheels, say twelve wheels, keeping to a low weight for each wheel, such as 5 tons, but still coming up to a total of 60 tons for the engine, whence it is argued that the weight for each wheel is only 5 tons, which ought not to be too much upon a 60-lb. rail. But this is only applicable to dead loads on fixed supports, or where the engine stands; for when running at a high speed the rail has no time to recover its original position for each wheel, the sleepers being sunk down into the ballast, and consequently the total weight of the engine must be taken as a charge upon the rails.

Opposite Practice in the Working of Railways.—In consequence of the growth of traffic, engines have been increased in weight from 30 to 60 tons, and carriages from 10 to 20 tons, while the rails have been kept to their original weight, 60 lbs. or 70 lbs. per yard. What could the result be under such circumstances but fatal both to the rail joint and to the wearing of the rail? Now, calculate what should really be employed, comparing the flange-rail section used in America and on the Continent of Europe with the bull-headed rail used with chairs on English roads. English engines weigh on the average 40 tons, and the carriages are very light. For this rolling-stock the rails weigh 80 lbs. to 90 lbs. per yard, with a cast-iron chair of 40 lbs. per yard, which, taken at half the value of the steel, would increase the weight of the flange-rail by 20 lbs. yer yard, that is from 100 to 110 lbs. per yard. But, if a 40-ton engine requires 110-lb. rails, a 60-ton engine should require half as much again, or one of 150 to 165 lbs., in order to be equal in strength and capacity to that of the English roads. For there is no reason why steel in the form of a flange rail should do more work than one in the form of a bull-headed rail. The bull-headed rail could be rolled much harder than the flange-rail without risk of breakage, and therefore a smaller weight in the former ought to correspond with the heavier flange rail; yet it is just the contrary in practice. Taking the average weight of rails at 60 lbs. to 70 lbs. per yard, as used in America and on the continent of Europe, it does not come up to half what it ought to be according to English practice. Now, is the English practice right or wrong? English railways represent an enormous capital, some of them more than £50,000,000 sterling, and most of the large lines pay a 6 to 7 per cent dividend yearly. In addition to the dividend they afford greater safety and comfort than any line laid with flange-rails. How is it that such an enormous difference in the fundamental engineering bases for working railways can have crept in? In England light engines are run on heavy rails, and in America and on the Continent of Europe heavy engines on light rails. * * *

Look again at the steady increase of the weight of the rail in England. No government regulations have forced English engineers to augment the weight. However, they have done so for the last 20 years, increasing it from 70 lbs. to 90 lbs. per yard as a matter of economy. Again, what was economy with the the price of rails 15 years ago at £16 per ton, can by no means be said to be economy at the present time with their price at only £4 per ton. The saving of labor for renewals and maintenance is now the vital question in the cost of railway working, and when this is brought to a minimum by perfection of road, a dividend is obtained at the same time that safety and comfort are secured in traveling. In the present state of things the rail-maker is put between two fires. He is limited to a very thin flange-section of light weight, to chemical composition and mechanical tests, and even a guarantee; if he makes the rails hard they break under the heavy rolling-stock, while if he makes them soft they will wear out in a few years. What then is the poor man to do? To save his reputation he will naturally keep on the safe side, but the result can by no means be economical to the railway. On the continent of Europe there are many roads with heavy engines, yet the weight of the rail is limited to what it originally was, notwithstanding the increase of traffic. Rail-sections are much deeper than in America, but there is only a very small head and a very narrow flange upon the rail, and a thin high web. Of course quality will go a long way, such as using a pure strong material, a mixture of Swedish iron, hammering of the blooms, perfection in execution of rolling and the best inspection. All this will be well worth considering if a minimum of weight must be maintained. The author, having been brought up in the midst of Swedish iron works, is certainly the first to appreciate good material, but there is a limit beyond which even this can be overloaded, and then the remedy is more metal.

Metal Sleepers.—The substitution of metal sleepers for wooden ones is of course entirely a question of locality and of price. In hot countries the metal sleeper is especially advantageous.

The phenomenon of steel rusting faster than iron, particularly when exposed to moisture, is an element of great importance in the metal-sleeper question, inasmuch as steel, being more easily rolled, is more and more largely substituted for iron in the form of sleepers. The author suggested one explanation of this phenomenon in his paper, but it seems, however, to be better explained in the *Engineering and Mining Journal* of New York for Feb. 6, 1886. It is there stated that the rapid rusting is due to the alloy of iron and manganese, the latter being a highly oxidizable metal. In this view the author agrees; and as steel is combined with very different proportions of manganese, varying from 0.25 per cent. up to 1 per cent., it would be of interest to compare the rapidity with which oxidation takes place in metal of such extremely different composition. Not only would this comparison be of interest for the question of rails and steel sleepers, but also for boiler-plates, ship-plates, and particularly for bridge work. If the suggested explanation should be confirmed by experiment, then the use of such steel as contains the least proportion of manganese would of course be preferable.

If equal safety is to be obtained, the metal sleeper must be of equal size and cover an equal surface of the ballast as the wooden sleeper; and before all else the rail must be stiff enough to distribute the load, or the effect of the concussion of the rolling stock, among many neighboring sleepers, instead of concentrating it upon one or two as in the case of light rails. A big-headed rail is also required, for the same reason that a blacksmith uses a heavy anvil for a heavy blow of the hammer. The great number of forms of metal sleepers, and the modes of fixing the rail to the same, must be puzzling to an engineer who has to select one of them. The simpler the plan the better. But any system will prove a failure within a very short period if used with a rail that is light compared with the rolling-stock. Indeed, experience on the Continent of Europe has proved this during the very short period they have been laid down; not only are the joints too weak, but the whole of the system is shaky, and will by no means do justice to the name of "permanent" way.

A 100-lb. Rail Needed.—With this mode of obtaining a perfect permanent way with the heavier form of flange-rails for roads with heavy traffic, say a rail in proportion to the rolling-stock according to English practice; a sleeper, whether of wood or iron, that will not dislocate the ballast; and the joint as strong as the rail, so as to give one line of continuous stiffness, the author suggests the adoption of a 100-lb. flange-rail as shown in the annexed cut. The rails should be joined accord to local circumstances, climate, etc. Where there is snow and ice, they should be joined with angular fish-plates; and in countries with a mild climate with deep fish-plates, giving an equal stiffness to the rail itself. Fortunately for the adoption of heavier rails, the extra cost at present will be reduced to next to nothing, in consequence of the fall of the price of rails, at least in Europe. Bnt even taking it per weight as increasing 50 per cent. of the metal in the rail per mile from 66 lbs. per yard up to 100 lbs., or 50 tons extra per mile, that would at the present price of, say, $20 a ton, only come to $1,000 a mile. This rail has got twice as much wearing surface as the 66-lb. rail, and consequently ought to last twice as long. Taking also into account the saving in maintenance of rolling-stock and road, and the recovery of 50 per cent. of its value when worn out, it would certainly be but a very small matter for many railway companies to make a trial with this rail for the most heavily worked parts of their line, and it is probable that after a few years' experience they would not go back to the light rails. The 100-lb. flange rail-section would be, if anything, cheaper than the ordinary English line, with 80-lb. bull heads and chairs. The section shown in the drawing is designed on the same basis as the Author's standard rail-sections, of which such large quantities have been made, and have given satisfaction alike to producers and consumers.

Strengthening of Rail-Joints.—But what is to be done with the already existing weak rails and joints laid down upon the present systems? They cannot be taken up all at once for the substitution of heavy rails. The weakest points upon the existing roads laid with flange-rails are the joints depending upon the angle for fishing. If this is as large as it is in many cases on the Continent of Europe, say 60°, instead of 30° as it should be, the bolts will constantly work loose, and the joint-sleepers sink in the ballast. In such cases there is no possibility of strengthening the joint by applying new strong fish-plates. The best way, in the author's opinion, is to apply a bridge-plate covering the two joint-sleepers, either of the Fisher's or of Elworth's plan, which can be adopted for wooden or for metal sleepers. Anyhow, the strengthening of the joint is but a temporary palliative as compared with laying down a heavier rail with a perfect joint of sufficient strength to correspond to the traffic and weight of the rolling stock.

Conclusions.—Thus, in conclusion, the practical suggestion for the improvement of the present state of roads laid with flange rails which have become unloaded is to employ as heavy a rail in that form as would compare with the English practice with rails of bull-headed section. The author would advise every engineer interested in the comparison to travel upon the English roads from London to Scotland and back, as well as to ascertain the cost of maintenance and renewals of the same. As for safety and comfort, the journey alone would be sufficient to convince him, and he would also conclude that the heavier flange rail would insure the success of metal sleepers, while the patching up of the joints by stronger fishes or by bridge-plates would only be a temporary expedient until financial circumstances should allow the more radical remedy of giving sufficient metal to do the heavier work.

In suggesting a 100-lb. rail, the author has met with less opposition than was at first expected, for to propose a sudden increase of 50 per cent. in the weight of rail is certainly a startling move. However, there are many railway engineers, both state and private, declaring themselves willing to make the experiment with the 100-lb. flange-rail. * * * * There is no fault or discrepancy in the pattern of the flange-rail, but on the other hand, no one could expect to succeed with rails of that form having one-half the metal only. Yet this is what it has come to by keeping in the old groove adopted in years gone by, and not changing with the progress of the times in the increase of traffic to triple, and the lowering of the price of rails to one-third, which tells in both directions. On the other hand, if the rail-makers in the present depressed state of trade would gain a temporary increase of output, that should certainly be no objection to the adoption of the heavier system, but at the same time this is not the motive of the author's suggestions. The maker's gain would after all be only temporary, for these rails would last twice as long as the others, not only because of their greater substance, but because their form enables the engineer to demand a harder material without risk of breakage, and this harder material would wear longer than the softer. It would, therefore, be to the makers only a temporary gain in increase of production. As it was said by some engineers that the first paper was quite true in its criticisms of existing deficiencies, but that it simply recommended harder and heavier rails, without any definite suggestion how to act, the author has now tried to comply with the wishes of his critics by giving his suggestions in greater detail, with a drawing of a 100-lb. standard rail section; by recommending the substitution of metal for wooden sleepers, and the strengthening of rail-joints on existing roads; and by specifying such tests as he should use.

[The author appends to his supplementary table the following modified table of tests, the lever tests being the same as given in the table in his former paper (*Railroad Gazette*, Feb. 26, 1886), but the drop in the ball tests and corresponding deflection limits have been considerably reduced, to permit the use of harder rails. The use of this table, unassisted by other tests, is subject to a certain danger, which we have noted elsewhere:]

PROPOSED TEST FOR STEEL RAILS.

LEVER TEST.

Weight per yard.	Distance of bearings.	Load.	Deflection for pieces, 6 ft. long rails.	
			Temp.	Perm.
Lbs.	Feet.	Tons.	Inches.	Inches.
30	3	5	1/8	0
		11	3/8 to 3/4	1/8 to 1/4
35	3	6	1/8	0
		13	1/4 to 3/4	1/8 to 1/2
40	3	8	1/8	0
		18	3/8 to 1	1/8 to 3/4
45	3	10	1/8	0
		22	1/2 to 1	3/8 to 3/4
50	3	12	1/8	0
		25	1/2 to 1 1/4	3/8 to 1
56	3	14	1/8	0
		26	3/4 to 2	1/2 to 1 3/4
60	3	16	1/8	0
		32	5/8 to 1 3/4	3/8 to 1 1/2
65	3	18	1/8	0
		35	1/2 to 1 1/4	3/8 to 1 1/4
70	3	20	1/8	0
		41	1/2 to 1 1/2	3/8 to 1 1/4
75	3	22	1/8	0
		43	1/2 to 1 1/2	3/8 to 1 1/4
80	3	23	1/8	0
		45	1/2 to 1 1/2	3/8 to 1 1/4
85	3	24	1/8	0
		48	1/2 to 1 1/2	3/8 to 1 1/4
90	3	26	1/8	0
		50	1/2 to 1 1/2	3/8 to 1 1/4
95	3	28	1/8	0
		51	1/2 to 1 1/2	3/8 to 1 1/4
100	3	30	1/8	0
		52	1/2 to 1 1/4	3/8 to 1 1/4

BALL TEST.

Weight per yard.	Distance of bearings.	Weight of ball.	Height of fall.	Proportion of test to weight per yard.*	Deflection usually obtained for pieces 6 feet long rails.
Lbs.	Feet.	Cwt.	Feet.		Inches.
30	3	10	6	2.0	2 to 4
35	3	10	7	2.0	2 to 4
40	3	10	8	2.0	2 to 4
45	3	10	9	2.0	2 to 4
50	3	20	5	2.0	2 to 4
56	3	20	7	2.5	2 to 4
60	3	20	9	3.0	2 to 4
65	3	20	11	3.3	2 to 4
70	3	20	13	3.7	2 to 4
75	3	20	15	4.0	2 to 4
80	3	20	17	4.2	2 to 4
85	3	20	19	4.4	2 to 4
90	3	20	21	4.5	2 to 4
95	3	20	23	4.8	2 to 4
100	3	20	25	5.0	2 to 4

* The figures in this column are obtained by multiplying the weight of the ball in cwts. by the height of the fall in feet, and dividing by the weight of the rail per yard in pounds. The lighter the rails the lower the speed, and therefore the lighter the test in proportion.

Car Accountants' Association.

The Car Accountants' Association held its eleventh annual convention in Buffalo last week, meeting at the Genesee Hote on Tuesday, June 15. For the account given below we are indebted to the excellent reports published by the Buffalo *Express* and the Buffalo *Courier*.

FIRST DAY.

The first business taken up at the morning session was the consideration of the reports of the officers. The Treasurer reported that 116 roads and lines are represented in the association, from which $580 in dues were received last year. The expenses were $565, leaving a balance of $15 on hand. The officers for the ensuing year were afterward elected as follows: President, A. P. Wilder, Atchison, Topeka & Santa Fe; Vice-President, R. F. Hoyle, East Tennessee, Virginia & Georgia; Secretary, H. H. Lyon, Chicago & Alton; Treasurer, E. M. Horton, Illinois Central. These officers were all elected by acclamation. The executive committee, as named, consists of Messrs. E. C. Spaulding, Western & Atlantic; D. F. Maroney, Baltimore & Ohio; A. P. Blakslee, Lehigh Valley.

The Committee appointed to wait on the general managers of the fast freight lines, presented a report which included a large number of letters in which the line managers held that the proposition of the car accountants to have mileage reported in bulk is impracticable, inasmuch as the cars which may be controlled by one road in the same line may be owned by several companies.

The report of the majority of the Committee on Switched Cars brought out a long discussion, in which nearly everybody took part. The question on which the entire discussion rested was which road had control of a switched car, to be placed on a private siding, the road delivering the car, or the road receiving it. The Committee held that in the delivery of the car, the receiving road should make a junction report of the transfer of the car the same as if it were delivered to the road for a long haul.

Mr. BLAKSLEE, of the Lehigh Valley, held that the control of the cars depended on the traffic arrangements between the different roads. In the handling of his company's trains they run them over the Erie and Pennsylvania roads themselves, but on delivering cars on private sidings on the Pennsylvania, the Lehigh Valley is not responsible for the cars, while under the same circumstances on the Erie, the Lehigh would be responsible.

Mr. H. G. SLEIGHT, of the Vandalia line, presented his road's plan of handling switched cars at Indianapolis. There, according to the table furnished by his road, there are 197 private switches, each numbered and with the name of its owner and the line on which it is located. In the company's reports a junction report of all cars switched is made and charged against the road on whose line the switch is located.

The report of the Committee provided "that when any road refuses to acknowledge receipt of switched cars on tracers, we will as far as possible return their tracers for similar cars marked 'no account,' and that when a road declines to furnish junctions of switched cars delivered off its line, claiming such cars never to have been in its possession or under its control, we will likewise stop sending such road

junction cards of any of its cars whatsoever, until such time as it agrees to report switched cars."

This was thought to be too strong, and the report was as a result rejected.

Mr. D. W. MOOAR, of the Grand Rapids & Indiana, presented the following resolution, which was carried:

"*Resolved*, That it is the sense of this association that all switched cars—and a switched car shall be considered as a car delivered by A to B, to be removed by B's engines—should be reported on junction card reports."

The Committee on Per Diem had no report, and on motion a new committee on the subject was ordered appointed.

The Committee on a Plan for Numbering Railroads was discharged, the Chairman reporting that the members had been unable to meet and decide upon a report.

The report of the Committee to wait upon the general managers of fast freight lines was again taken up and a resolution adopted that a committee be appointed to confer with general managers of railroads and fast freight lines with a view of having all line car-mileage reported to managers of line car companies and upon blanks furnished by the managers, the managers of line companies to be requested to simplify the blanks by requiring the fewest possible divisions or series of mileage, and no division be made of the mileage of any one company's cars in the same line.

The meeting was then adjourned to the next morning at 10 o'clock.

SECOND DAY.

The first business was the selection of a place for the next meeting, and Atlanta, Ga., was chosen.

The programme was then resumed where it was left on Tuesday, the first question being: "How should foreign mileage be reported?" After a long and interesting debate, the subject was relegated to the table for future action.

The next question was: "Should individual mileage reports be made monthly?" It was decided that the time had come when correct reports should be made, and it was decided that a committee of three should be appointed to take the matter in hand.

Next came the question, "Should there not be a uniform mileage rate on passenger, baggage, express and postal cars?" The different existing rates were mentioned, from which it was apparent that reform was desirable. On motion President Wilder appointed as a committee to report on the subject H. W. Pratt, of the St. Louis, Keokuk & Northwestern; T. J. Hoyle, of the East Tennessee, Virginia & Georgia, and H. C. Johnson, of the Pittsburgh & Lake Erie. They reported the following schedule, which was adopted by a vote of 33 to 13: Coaches and combination cars, 3 cents per mile; postal cars, 2 cents, and baggage and express cars, 1 cent.

At the afternoon session the President named as a committee on Individual Mileage Reports C. J. Fellows, of the Cleveland, Columbus, Cincinnati & Indianapolis; E. C. Spaulding, of the Western & Atlantic, and D. W. Moore, of the Grand Rapids & Indiana. They were instructed to report at the next meeting on the desirability of a plan for the mutual interchange of records of the daily movement of cars.

The sixth question read, "Why should not 'boarded' cars, with the signatures of officers of railroads, be handled promptly and in accordance with the instructions on these boards?" It was decided that there was no reason why they should not be so handled, and a resolution to that effect was adopted.

D. W. MOOAR, of the Grand Rapids & Indiana, read a paper on the question, "Are junction reports, with the present junction cards, as adopted by the Car Accountants' Association, giving as much information as they should, or should the form be changed so as to include the point of delivery and the mark opposite loaded cars?" He took the ground that the association had not in its meetings given the subject due attention.

On motion of H. G. SLEIGHT, of the Vandalia line, an extra cloumn was ordered added to the junction cards, to show by means of a mark whether the car was loaded or empty.

It was decided to be advisable on all general tracers from the home company to direct connections to show at what point or points deliveries were made.

The ninth question, which was regarded as of great importance, was as follows: "With whom does the responsibility for cars rest—with the road receiving such property from the home company, or does it not shift beyond to roads' junction cards locate car on? It is not the duty of owners to trace and look to such latter road for return, irrespective of what road originally delivered to, or that car may have passed over?" After an exhaustive debate, the following resolution, introduced by E. M. Horton, of the Illinois Central, was adopted.

"*Resolved*, That it is the sense of this association that roads on which the car is located is responsible for its return, and is the line to which the tracer should be sent."

E. C. SPAULDING, of the Western & Atlantic road, read at this juncture a very interesting paper on the life of freight cars. The life of an ordinary freight car he placed at 13½ years. For the first five years it was a good investment, but for the second five the repairs generally absorbed the income. With these facts in view, he did not consider three-quarters of a cent an excessive mileage.

The tenth question was: "Should mileage be paid on individual cars, tank line and private horse cars?" It was decided in such cases to be proper for the accountant to consult with the proper freight official of his road whether they pay mileage or not, and act accordingly.

On a motion that the report of the Committee on the Distribution of Cars, left over from Tuesday, be heard, the Chairman, D. F. Maroney, of the Baltimore & Ohio, stated that he had prepared a paper on the subject, but had left it unfortunately in Baltimore. He promised to send the paper to be printed in the official proceedings.

On motion, the meeting proceeded to elect a committee of five to visit the general managers at their annual time convention, to be held in New York in October, and recommended that action be taken on the switched car, uniform mileage for passenger equipment, and other pressing and important questions. The gentlemen elected were: J. A. Keesbury, of the Pennsylvania; F. J. Hoyle, of the East Tennessee, Virginia & Georgia; E. C. Spaulding, of the Western & Atlantic; W. A. Moody, of the Richmond & Danville; J. C. Hunt, of the Grand Trunk, and C. P. Chesebro, of the Wabash, St. Louis & Pacific.

The association elected as honorary members: O. E. Tiffany, Lost Car Agent of the Lackawanna, and Joseph Brown, General Freight Agent of the Western & Atlantic. The following were given the rights of active members without the payment of dues: A. W. Davies, of Cleveland; L. P. Sechrist, of the *Railway Equipment and Mileage Guide*; F. W. Kilby, Car Accountant of the Georgia Railroad, and E. J. Halsted, Lost Car Agent of the Chicago & Alton. Two were given the privilege of the floor without vote. They were Major Hotchkiss, Traveling Agent of the Chesapeake & Ohio, and Alonzo Blakslee.

President Wilder announced the following standing committees for the ensuing year:

Executive—E. C. Spaulding, D. F. Maroney, A. P. Blakslee.

Publication—H. A. Lyon, H. P. Chesebro, W. J. Mulvihill, E. L. Hill.

Location—E. C. Spaulding, H. N. Eastman, Clifton Brooke.

Arrangement—E. C. Spaulding, F. J. Hoyle, W. A. Moody, Theodore Wells, C. L. Hill.

Subjects for Discussion—S. G. Parker, A. Dreymal, R. Peckham, C. Kelly, J. B. Terbell.

Constitution and By-Laws—D. W. Moody, A. C. Van Valkenburg, M. McKinnen, Theodore Wells, J. N. Reekie.

Distribution of Cars—H. G. Sleight, A. J. Speese, A. P. Blakslee, E. G. Squire.

Per Diem—E. Gardley, C. P. Chesebro, M. C. Trout, W. A. Moody, C. W. Cushman, J. H. Masten, J. R. Cavanaugh, G. S. Russell, J. A. Keesberry.

Fast Freight Line Cars—D. F. Maroney, C. E. Mallory, J. G. Hunt.

To wait on general managers about fast freight line mileage reports—M. C. Trout, F. B. Hannis, G. H. Weeks.

Individual Mileage—C. J. Fellows, E. S. Spaulding, D. W. Mooar.

On rate for passenger equipment—H. W. Pratt, F. J. Hoyle, H. C. Johnson.

After passing the usual complimentary resolutions, the association adjourned.

On the following day an excursion was taken to Niagara Falls, and on Friday the members made a trip to Chautauqua Lake, returning in the evening. On Friday evening nearly all of them left for home.

American Society of Civil Engineers.

The following circular in relation to the convention at Denver has been issued by the Committee of Arrangements, the members of which are Messrs. Wm. R. Hutton, Wm. H. Wiley, Robert B. Stanton, A. M. Wellington, R. E. McMath and John Bogart:

"The general arrangements for the Convention remain as stated in the previous circular. The special train will arrive at Denver early Friday morning. The sessions of the Convention will be held on Friday, Saturday and Monday, July 2, 3 and 5. The excursions will be as stated in former circular.

"The special train will leave New York (Grand Central Depot) at 10 a. m. *sharp* on Tuesday, June 29. It will be run as a second section of the limited express, over the New York Central & Hudson River; the Lake Shore & Michigan Southern, and the Chicago, Burlington & Quincy railroads. It will pass the following places a little after the times stated as follows: Albany (N. Y. C. & H. R. R.), 13:00 eastern time, Tuesday; Syracuse, 17:00 Tuesday; Buffalo, 19:45, central time, Tuesday; Erie (L. S. & M. S.), 22:00 Tuesday; Cleveland, 24:25 (night) Wednesday morning; Toledo, 3:30 Wednesday; Elkhart, 6:50 Wednesday; Chicago, arrive, 10:20 Wednesday morning; leave Chicago (C., B. & Q.) 14:00 Wednesday afternoon; Burlington, 21:00 Wednesday; Pacific Junction, 8:25 Thursday; Plattsmouth, 8:50 Thursday; Lincoln, noon Thursday; Oxford, 19:20 Thursday; McCook (arrive), 21:45, central time; leave, 20:55, mountain time, Thursday; Denver, 7:00 Friday morning.

"A special car will leave St. Louis on Wednesday and be run to Monmouth Junction or Burlington, where it will be attached to the special train; members desiring to take the St. Louis car will please communicate with Robert E. McMath, Sewer Commissioner, City Hall, St. Louis.

"Sufficient cars to accommodate all who notify the Secretary of their intention to take the train will be provided at New York. An additional car will be attached to the train at Chicago.

"The train will consist of sleepers and hotel cars. Meals will be regularly served on the train at 75 cents per meal. The cars are chartered by the Committee for the whole trip. The railroad companies haul the whole train at a fixed rate per mile. No railroad tickets or passes will be of service on this train. The Committee will provide cards of identification for all entitled to travel upon it.

"It will be seen that the cost to each person can be positively determined only when the Committee know the total number of persons. The Committee can now say that the price will be in all probability not to exceed $60 from New York; $50 from Cleveland; $40 from Chicago; $40 from St. Louis. This is to include the transportation on the train to Denver and return and one berth (half a section) in a sleeping car. A full section for one person will, of course, involve an extra charge.

"*Members who desire to join the train at any point*, who have not already notified the Secretary, *are requested to do so at as early a moment as practicable, either by letter or telegraph.*"

The Secretary's address is: "American Society of Civil Engineers, 127 East 23d street, New York."

Members purposing to attend the Convention, who have not already notified the Committee, are requested to do so at once.

In addition to papers and discussions already announced, the following will be presented at the Convention:

The Davis (Crevasse) Levee: S. F. Lewis.

A Novel Application of the Polar Planimeter: Charles E. Emery.

Excessive Rainfalls: R. L. Hoxie.

The American Line from Vera Cruz to Mexico, with Notes on the best methods of surmounting high elevations by rail: A. M. Wellington.

The Negative Values of Distance, Rise and Curvature on Railroads: H. V. Hinckley.

English and American Railroads Compared (Supplementary paper): Edward Bates Dorsey.

Building Stones: Alexis A. Julien.

Contributions.

The Short-Comings of Technical Schools.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Some years ago there was exhibited in New York a famous picture by Zamacõis called "The Education of a Prince." The prince, as becomes his tender years, is represented as being amused and at the same time educated with the playthings which are the proper instrumentalities of the education of one so young. The picture would have failed to convey its meaning had any other been introduced. And it is probably typical of the foreign system of education, that the means of education are never in advance of the capacity or training of the student. It would probably never occur, for instance, to the faculty of a European University to give a diploma in any particular professional school, or in fact to allow any one to begin the course leading to such special diploma, until they were thoroughly satisfied that the applicant had finished his general education. Even if they were not so satisfied, they would probably never think of attempting to give the student a general education while giving him instruction in his professional course. And in all professions, except that of civil engineering, the same holds good in this country also, for it is well known that professional studies, if rightly pursued, are enough in themselves to fully occupy the time and attention of even the most mature students, and some of us know from experience that the studies which prepare the way to the degree of civil engineer require more time and more maturity than those of any other profession.

And yet of all the professions it is the only one not thought worthy of having schools devoted exclusively to the special studies which the diploma should testify had alone occupied the attention of the student. The attempt is made to combine all the studies, except the classics, of the regular undergraduate academic course of other colleges with the studies proper to the technical school, with the result that the majority of the graduating classes from our engineering schools have an education which can only be called complete because it is composed of two halves, half of a general and half of a professional education. Languages form a very useful part of the preparatory or general education of an engineer, but none of his technical course; and moral philosophy, if his nature be thoroughly imbued with it, may help him in his dealings with contractors, but its study should not be allowed to distract his attention from the attempt to thoroughly digest the more practical teachings of Henck and Weisbach and B. Baker. There are no studies which the untrained mind is so apt to think it comprehends as those pursued by technical students, and therefore they should be approached with all possible preparation and maturity, and yet the attempt is constantly made to cram into the heads of mere boys, together with a wadding of glittering generalities, principles and practice which men of twenty-five find it difficult to master.

A recent graduate of a New York engineering school is responsible for the statement that the professor of applied mechanics read the students' notes of the general principles of bridge-building, for instance, but referred them to a long list of books for further information, saying that there was not time for a complete course on that subject, and yet at the same time they were required to attend all the courses in other studies which had no reference whatever to the profession they were supposed to be preparing for. A graduate of another and still better known institution was frequently heard to complain of his entire inability to understand the principles governing the calculation of strains in framed structures, but that otherwise inexplicable state of affairs was easily explained by a sight of the text books he had used while in college. His "Bartlett's Mechanics," for instance, was fully interlined with the solutions of every difficult expression, and it appeared that such notes were (and probably still are) a "transmittendum" from class to class, without which none but the most brilliant students could hope to make a recitation unless some of the studies were entirely neglected.

Can we hope that such a state of affairs will come to an end, and that a time will come when a school of engineering as a real profession will form a department of some of our metropolitan universities, where no one may enter without thorough preparation in all the pure mathematics needed during the course, and where nothing more elementary than surveying, drawing and mechanics will find room, and from which all studies not bearing directly upon subsequent professional work will be rigidly excluded?

I am prompted to make the above remarks by a recent bit of experience. Being in need of rodmen, chainmen, etc., for a preliminary railroad survey, I applied to the engineering department of a well-known college for the names of recent graduates. Many of the students replied to my application, and with but few exceptions the letters were childish in form, weak in spelling and execrable in grammar, showing an entire lack of proper general cultivation.

RODMAN.

The "Cranks' Standard Sub-Division."

Pittsburgh, Cincinnati & St. Louis Railway Co., Chief Engineer's Office,
COLUMBUS, O., Dec. 23, 1885.

TO THE EDITOR OF THE RAILROAD GAZETTE:

When I ventured, about a year ago, to present, with all becoming modesty, a few observations and reflections on "Rail Joints" to a local engineers' society, of which I am a member, I never dreamed of the troubles and tribulations which that rash plunge into a dark subject has since brought forth. Of course I expected to be mildly cross-questioned and gently criticised by my fellow members in the usual fashion, as a matter of courtesy, but there I expected the case to drop. But I know now what my favorite German poet meant, when he said—

"Das ist der Fluch der bösen That
Dass ohne Unterluss sie Boeses muss gebaehren."
("It is the curse of the misdeed
That ceaselessly it leads to constant doing wrong.")

After politely consenting to the simultaneous requests of a dozen publishers of technical periodicals to permit each to print the paper in advance of the other eleven, I was kept busy for several weeks afterwards correcting and changing the signs and symbols in the formulæ on the proof sheets, so as to prevent the figures from telling the awful lies which the mathematical editors had put in their mouths.

Then I was commended by the chief editor for bringing up before the profession a subject of such vital importance, and in the same issue I was ridiculed by a correspondent for saying so much on a matter so trifling and simple.

A fellow from the New York, Pennsylvania & Ohio Railroad, signing himself "Practical Railroader," sent me a postage stamp and wanted to know, by return mail, whether

the breaks in the angle bars occurred mostly in the new of the moon.

A young chap from Troy, who said he had just graduated at the head of his class, and intended to devote himself to railroad engineering as a specialty, suggested that a series of instantaneous photographs, taken of a rail-joint under the passage of an express train, might be developed into a final determination of the true "typical fracture," on the principle of the "ideal" features obtained from a series of photographic portraits.

A professor of applied mathematics in Ohio University proposed to determine the magnitude and direction of the stresses on the rail-joint from the scratches made, during the passage of a train, by a lead pencil fastened to a splice-bar and making its marks upon a cardboard placed alongside of the track, all according to the laws of the "synchronic wave," as induced by "cumulative vibrations."

I am haunted by patent fiends. They call before breakfast for fear I might leave town on the early train, and they await my arrival when I return late at night, tired to death. They ring me up by telephone, and they stop me at the way-stations along the road; they send me photographs, blue prints, models and casts; they have all read my paper, and, knowing that I take an interest in this thing, they submit their pet contrivances to me for an expression of my opinion; they all know that there *are* other fixtures intended to answer the purpose, but each one is satisfied that his own is the best; they hope I will give it a trial and, by my indorsement, insure its success, and they hint that its success might be an "object to me."

I had two additions built to my office to hold all these accumulations of the creations of inventive genius, but still they come, and I have now arranged to build five miles of track, which will be called the "Cranks' Standard Subdivision," to which all these infernal devices, conceived in drunken dreams, and executed by mechanical lunatics, will be consigned hereafter.

You see from this that I have my hands full. I almost forgot that I am doing duty on two committees, on "Tests of Rails and Splices," and that I am invited to serve on another, whose object is to find out whether it is best to make the rail heads fit to the wheel flanges or the wheel flanges to the rail heads.

M. J. BECKER.

THE SCRAP HEAP.

Fast Time on the Boston & Maine.

A special car, hauled by locomotive "Massachusetts" No. 9, left Boston at 1:08 o'clock Saturday afternoon, on the Boston & Maine road, and arrived at North Berwick at 2:50 p. m.; distance, 80 miles. It contained the directors and the Superintendent. The trip was made to see how much speed express trains could attain on the road. It went through to Portland.—*Boston Advertiser June* 21.

Rats.

Rats as a general thing are capable of doing more damage to the square inch than any other animal of their size. It is, however, seldom that we hear of one tackling a railroad and coming out winner, yet such is the case. Last night the regular freight on the Consolidated road at 9:30 stopped in East Bridgeport to take on some cars. The brakeman turned the switch, which is known among railroad men as a split switch, to let the engine in on the turnout. The switch is operated from one of the little round houses, built for that purpose. The switch responded correctly to all appearances, and the signal was given to the engineer to go ahead. The engine started and the driver soon discovered he was off the track. An investigation revealed the fact that a huge rat had been caught in the jaws of the switch which had forced it open far enough to allow the engine to leave the rails. Word was sent to the depot, and the engine of the 10:10 train from New York went over and pulled the derailed engine on the track. Fortunately but little damage and delay was the result.—*Bridgeport (Conn.) Standard, June* 16.

Fast Time Six Years Ago.

Lew Silence is one of the veteran passenger conductors on the New York Division of the Pennsylvania Railroad. His name suits him, too. He seldom talks. He runs the 7:30 train to New York every morning. Yesterday he pulled a little note book out of his pocket, and turning to June 13, said: "I made that memorandum six years ago. That was the fastest run ever made on the New York Division of the Pennsylvania Railroad from Philadelphia to New York—92 miles in 93 minutes. The train made three stops and seven slow-ups. There was only one car and an engine. The car was filled with passengers from the West and I ran the train. There had been a storm up in the state the night before, and on the Middle Division of the main line, between Harrisburg and Altoona, a big tree blew across the track. I think it was in the Lewiston Narrows. The fast line, as the train was called, was 4 hours and 21 minutes late when it got to Philadelphia. I got orders to take those passengers to New York as quick as an engine could pull a car. The whole road was cleared for my train. We went so fast that telegraph poles looked like toothpicks and houses looked like soap boxes. One mile was made in 46 seconds, another mile in 47 seconds and a third mile in 49 seconds. When we went down the hill at Menlo Park we traveled three miles at the rate of 78 miles an hour around curves and on the straight track. If a man had put his head out of a window he would have lost his breath. That's the history of the fastest run ever made on the New York Division. I've been on some pretty fast trains, but that beat them all. I often see stories in the newspapers about fast runs made on Western roads, but when you come to ride 92 miles in 93 minutes, through a thickly-settled country like that between this city and New York, why, it's fast riding, because an engineer has to slow up going through every big town. Still, we went through Elizabeth that day running 58 miles an hour."—*Philadelphia Times.*

Ornamenting Railroad Stations in England.

The cultivation of flowers is a pleasing characteristic of English railroad stations. There are some stations—such as Dumfries, on the Glasgow & Southwestern main line, and Didsbury, on the Manchester South District—that owe their prodigal show of shrubs and flowers on the platforms to the professional nurseryman displaying his horticulture as an advertisement. It is not to these elaborate instances that allusion is here made so much as to the country-side stations, where the station-master and his man and lad spend their spare time, from the booking-office and the lamp room, in beautifying their platforms with borderings, and plants, and flowers.

And how charming is the result of their recreative efforts to travellers in passing trains—what visions of beauty alternate between bridge and tunnel and cutting—what pleasant glimpses of color! "The speech of flowers excels all flowers of speech," and it is heard above the screech of the engine-whistle and the noisy rattle of wheels.

Railroad directors, supposed by most people to be the most case-hardened of men, are even guilty of cherishing this taste for floral cultivation among the workers on the line. They not only give their employés garden allotments to cultivate peas and beans, cabbages and potatoes, fruit and flowers, but one board of directors (that of the Midland Railway) votes an annual sum of £100 to be distributed in prizes over the line for the most neatly kept platform gardens at the passenger stations. Last year (1885) as many as 76 stations competed, and the prizes were gratuated from £10 to 5s. The result was very gratifying.

Even stations such as Armley, at Leeds, and Brightside, at Sheffield, which are enveloped in foundry smoke and vitriolic vapors, despite their antagonistic surroundings, succeeded in producing pretty floral effects. At other stations, where the vegetation was in a less degree liable to be parched on the railway slopes, and suffered in a minor degree from engine sparks and smuts, the effect of the efforts put forth was most encouraging. At Kinnersley, a station on the South Wales section, clay banks were converted into terraces of flowers, and "the desert was made to smile." At Bakewell, banks before rough and unsightly, were planted with carpet-like turf, and diversified with flower designs and devices in shining Derbyshire spar. In the spring they were gay with tulips and hyacinths. People came from a distance to see them. In the summer bedding-plants were substituted; while rustic baskets with ferns and trailing flora were suspended from the roof of each platform.

It is eminently satisfactory to learn that at the stations where the borders are kept the best the public have most assisted in preserving the plants. Where the flowers have been most profuse the customers of the line have been most zealous custodians. The much-maligned "cheap-tripper" has refrained from plucking them; and even on thronged excursion platforms, during the busy summer months, not a single bloom has been missed. This encouragement gives hope of even better results in future years.—*Cassell's Family Magazine for July.*

Fast Time.

The Master Car-Builders held their annual convention at Niagara Falls last week, closing June 11. The Western members were taken by a special train of four cars over the Great Western Division of the Grand Trunk, and a remarkably fast run was made—leaving Niagara Falls at 9:45 a.m., and arriving at Windsor, a distance of 229½ miles, at 2:55 p.m.—5 hours and 10 minutes, including stops, of which there were 13, and three of them 17, 10 and 8 minutes respectively. Excluding stops, the run was made in 3 hours and 57 minutes—or 229½ miles in 237 minutes. With exception of 11 miles on the Copetown grade, a uniform speed of 60 miles an hour was maintained throughout, and the road-bed is in such excellent condition that the cars ran so steadily that it was observed water in a glass nearly full on the table did not spill.—*Toronto (Ont.) Railway Life.*

The Fastest Time Yet.

The owl train to Philadelphia had just pulled out of the Jersey City Station last night when a lean, long and lank brakeman with crushed-strawberry hair sidled down the aisle. He noticed an acquaintance—one of the regular riders—in a rear seat, and smiling diagonally sat down beside him.

"I see Lew Silence is a-talkin' about fast time on the York division of the P. R. R.," he began. "He says that he run a train what made 92 mile in 93 minutes. Why, that ain't nothin'. That ain't fast time for a leetle bit. I've run on trains what did make fast time, time as could be called fast, but I don't do no talkin' about it."

The lengthy brakeman closed his lips with a snap, and looked knowing.

"What time have you made?" asked the passenger.

"Oh, it don't make no difference," replied the railroader, in a rather aggrieved tone of voice, "an' I won't say nothin' about it, but I know onct when time *was* made, right on this here line. We left Jersey for Phillie with a clear track. Jest as we started the telegraph operator sent a message to Phillie. We hummed through the city, an' when we reached the open air we began to travel some. I had just time to take a chew o' tobaccer before we reached Newark, an' we dusted through that town so fast that all we could see o' the place was a dark spot on the sky. There was a giddy sort of a conductor aboard what had a crazy habit o' jumpin' up in the car. He was standin' at the for'ard door o' the car when he jumped, an' before his feet touched the floor agin he was slammed up agin the rear door with a force that nearly cracked his neck. Well, we got to Phillie before the giddy conductor found out what ailed him. I told you that the operator had telegraphed to Phillie when we started from Jersey. Well, the message hadn't reached Phillie when we got there. No, sir. We made the run so fast that we beat the telegraph. But that ain't all. I had a small clock on the train that struck the hours. We left Jersey at 12 exactly, and the clock began to strike as we started. When we stopped at the Broad Street Station in Phillie the clock had only got as far as ten strikes. That was somethin' like fast time, wasn't it?"

And all the passengers agreed that it was.—*New York World.*

TECHNICAL.

Pig Iron in Alabama.

In an editorial in our last issue on the production of coke iron we had occasion to refer to the remarkable increase in production of this grade of iron in Alabama in 1885 over 1882, the year of the greatest production of pig iron in the United States. In 1882, 57,224 net tons of pig iron were produced in this state. This has risen to 149,865 tons in 1885, the largest production of coke iron in any southern state, except Virginia, and ranking it the fifth in the production of this grade of iron in 1885, it being the eighth in 1882. If the projects for building blast furnaces in the state which are contemplated and under way are carried out Alabama in 1887 will be the fourth if not the third in rank of the states producing bituminous pig iron. It will then be excelled only by Pennsylvania and Ohio, and possibly by Illinois. The second stack of the Woodward Iron Co. is approaching completion; the Sheffield Furnace Co., of Sheffield, has advertised for bids for a furnace of 100 tons daily capacity; the Brierfield Coal & Iron Co. is changing its furnace, the Bibb, which has heretofore used charcoal, to run on coke; the Pioneer Mining & Manufacturing Co., of which Mr. Samuel Thomas is President, as stated in our last issue, will begin the construction of a furnace near Birmingham the present year, the ground being laid out for two furnaces. It is also reported that Mr. De Bardeleben and the Pratt Coal & Iron Co. will each begin the construction of two furnaces in the fall. As to these last furnaces we have no definite advices, but the Pioneer and the Sheffield will, without doubt be begun soon. The Woodward will be finished and in operation the present year, while the Bibb will go in on coke at an early date. Altogether Alabama promises to be in 1887 even a more important factor in the pig iron industry than in any previous year.—*American Manufacturer Pittsburgh.*

A Large Steel Casting.

The Otis Iron & Steel Co., of Cleveland, has just finished the top section of the anvil block for a 15-ton hammer, now being built by the Morgan Engineering Co., of Alliance, O., for the Crescent Steel Works, of Pittsburgh. The section weighs 55,170 lbs. This is by more than 50 per cent. heavier than any other steel casting ever made in this country.

Westinghouse Brake Pumps.

The Westinghouse Air Brake Co. announces that, inasmuch as its air brakes have now been in use some 15 years, there are a large number of pumps which need general repairs, and, therefore, in order to promote the highest efficiency, the company will supply new pumps of latest design and allow half price for return of old and partially worn out pumps.

Coal-burning Locomotives in a Forest Country.

Within little more than a year all the locomotives on the St. Paul & Duluth road (43) have been changed from wood-burners to coal-burners, though it is almost a continuous forest al ng the road.

Steel Wire Floor Matting for Cars.

This floor covering has recently come into use on steam and street car floors as well as for door mats, and is apparently indestructible. It consists of steel wire interwoven in a series of spirals, strengthened by a rectangular system of steel bars and heavy steel wire, and bound at the edges by a half-round steel band with the flat side against the mat. The matting so formed is about ¾ in. thick, and the wires at the surface are so shaped as to form comfortable support for the feet, while at the same time they are sufficiently open to be self-cleaning, and require no shaking for that purpose. It is difficult to see how greater cleanliness, durability or comfort could be secured. These mats are manufactured exclusively by the Hartman Steel Co., Limited, Beaver Falls, Pennsylvania.

The 24-hour System on the Canadian Pacific.

Vice-President W. C. Van Horne, of the Canadian Pacific, has issued the following order, dated Montreal, June 10:

"In view of the new conditions that have to be met by this company in establishing a continuous train-service on a line of railroad covering 53 degrees of longitude and soon to cover 60 degrees (or four hours of time) it is necessary for convenience, and to avoid confusion, to adopt what is known as the 'twenty-four hour system,' that is, to substitute the numbers 13 to 24 for the present p. m, hours 1 to 12, so that the hours from midnight to midnight will be numbered from 1 to 24.

"A large majority of the railroad managers of Canada and the United States have formally expressed their opinion in favor of the 'twenty-four hour' system, and this opinion is concurred in by the public press and by all the leading scientific men of the continent.

"The wisdom of the adoption of the 'Standard Time' system which is now used throughout North America is no longer disputed, and it is only a question of a very short time when the 'twenty-four hour' system will be as generally followed. It will be an honor to Canada to take the lead in this important reform. The directors in taking this step hope for the approval of the public and the hearty co-operation of all the employés of the company.

"It is intended to make the change first on all lines of the company, west of Lake Superior, beginning with the next change in time-tables.

"Paper dials with the new afternoon numbers will be furnished both for clocks and watches free of charge to the public as well as to employés of the company. These dials may be easily applied to any watch or clock by following the directions accompany this circular. Arrangements will be made at the different divisional points for their application to the watches of employés, and those who are unable to have them applied by the persons appointed for the purpose may obtain them from any agent of the company. Those requiring dials for clocks should state the diameter of the clock dials inside of the present figures."

The Russian Railroad in Central Asia.

A correspondent writing from Askabad to the *Russki Viedomost (Russian Gazette)* says: "The construction of the Transcaspian Railroad is progressing rapidly toward completion. The embankment is nearly ready all the way to Merv, and the rails are alfeady laid down to Kaakhee, a point about 30 versts distant from the future station of Dooshck, so that everything is ready for opening 560 verts of line. The carriage of material and the means for its transport or both on an extensive scale, and it is hoped that circulation will be possible up to Merv from June 1. At the present moment great activity is being shown in the construction of the bridge over the River Tendghen, which work has been partially delayed through the peculiarly unfavorable nature of the ground forming the bed of the river, in consequence of whichit has been necessary to sink into it five rows of cast-iron piles, each pile being 63 ft. in length. At Askabad itself, the future centre of the Transcaspian railroad system, the buildings in connection with the railway are rapidly rising. They are all very elegant structures, and the station itself will be after a design by the Academician Urlaub, and not unworthy of any town in European Russia."

Western Society of Engineers.

The 225th meeting was held in Chicago June 1, President Wright in the chair.

Applications to be admitted to membership were received from a number of engineers.

The Committee on Bridges presented a report on the paper by Mr. J. F. Clarke, referred to that committee.

The following query was read by the Secretary and referred to Committee on Railroads, Streets, etc.:

"What is the best pavement or improved roadway for a city residence street having a limited amount of travel?"

Mr. Liljencrantz read a paper on the Stadia Rod.

Mr. Wright, Mr. Cregier in the chair, read a paper on Organization of a Surveying Party. The Society then adjourned.

Members who desire to obtain the engraved certificate of membership, issued by the Society, are requested to communicate with the Secretary, giving full name to be inserted.

Members are earnestly requested to correspond with the Secretary, or the proper standing committees, volunteering papers, discussions of published papers or queries on professional topics.

The standing committees are urged to provide papers, discussions or queries on the respective topics assigned to them.

An Inclined Plane Railroad.

A new inclined plane road has been completed from the Shohola Station, on the New York, Lake Erie & Western road, into the Shohola Glen, which is becoming quite a popular resort for excursion parties. The road is worked on the cable plan, the motive power being a large turbine wheel, the water for which is taken from the Delaware River,

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

Passes.—*All persons connected with this paper are forbidden to ask for passes under any circumstances, and we will be thankful to have any act of the kind reported to this office.*

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

EFFECT OF RATES ON NEW YORK-CHICAGO TRAVEL.

The experience of the trunk lines last year and in the latter part of 1884 in competing for through passengers at rates which a large part of the time were from $8.50 to $10.50 from New York to Chicago, by all lines except the Pennsylvania, threw a great deal of light on the extent to which travel can be stimulated by extremely low rates, and how far travel can be preserved while charging about twice as much as one's competitors.

The eastern trunk lines had pooled their passenger traffic, and their rates were maintained probably better than ever before throughout the year 1883 and until August, 1884, when the pool was dissolved. The limited first-class fare from New York to Chicago was $20, with $18.50 as the lowest "differential." After the pool was dissolved there was no general reduction of fare until October, but by November all the lines except the Pennsylvania had reduced the prices of tickets very largely, and on the average about two-fifths, and shortly afterward further reductions were made, so that for about eight months of 1885 the prevailing rates were $8.50 to $10.50 from New York to Chicago, or about half the regular rates, by all lines except the Pennsylvania. It maintained the $20 rate until June, 1885 ($25 for its limited train), and then made its rate $15, until all the lines together restored the old rates last December.

Now, what was the effect of this great and long-continued reduction in fares on travel and earnings? We give below the number of tickets sold from New York to Chicago or points beyond, the average amount received per ticket, and the aggregate receipts from these tickets for successive half-years for the eastern trunk lines, that is, as far as Buffalo, Pittsburgh, etc.:

Six months to June 30:	1884.	1883.	Decrease.	P. c.
Number of tickets sold.....	37,430	37,744	314	0.8
Aggregate receipts	$336,151	$347,866	$11,715	3.4
Average per ticket	$8.98	$9.22	$0.24	2.6

This comparison indicates that the travel is ordinarily pretty steady. The business was substantially the same in the first half of 1884 as in the first half of 1883, and so were the rates and the earnings. The small change in the average rate may have been due to greater sales of tickets by the "differential" routes.

In the second half of the year the ticket sales and receipts were:

Six months to Dec. 31:	1884.	1883.	Inc. or Dec	P. c.
No. tickets sold...	57,152	48,450 +	8.702	18 0
Receipts therefor...	$415,714	$441,024 —	$25,310	5.7
Average per ticket..... ...	$7.27	$9.10 —	$1.83	20.0

Here we have a reduction of 20 per cent. in the average fare followed by the large increase of 18 per cent. in the travel, so that the reduction in receipts was but small. It should be remembered, however, that there was very little reduction in the fares until October, and that the Pennsylvania was charging full fares all the time. The average of the roads other than the Pennsylvania was only $6.18 for the half year.

In the first half of 1885 rates were down all the time, and the comparison with the first half of 1883, when rates were maintained, is as follows:

Six months to June 30:	1885.	1883.	Inc or Dec	P. c.
No. tickets sold.....	48,692	37,744 +	10,948	29.0
Receipts therefor	$238,779	$347,866 —	$109,087	31.4
Receipt per ticket...	$4.90	$9.22 —	$4.32	46.8

Thus by a reduction of about 47 per cent. in the rate (making it less than 1 cent per mile), the travel was increased 29 per cent., and earnings decreased 31½ per cent. The railroads carried 10,948 more passengers and earned gross $109,000 less for carrying them.

In this half-year the rates were even more favorable than appears above for attracting passengers, for the average of railroads other than the Pennsylvania was but $4, and these did not all charge alike, the average of one being considerably below this even. There was an assortment of fares from which to select, aside from the second-class tickets, which did not make much of a figure.

Rates were not fully restored until December last, but they were advanced somewhat after August, and this, with the full restoration in December, brought up the average considerably. We will compare the business in this half year with that of the corresponding halves of 1884 and 1883, as follows:

Six months to Dec 31:	1885.	1884.	1883.
No tick ts sold..	55,755	57,152	48,450
Receipts therefor	$328,234	$415,714	$441,024
Average per ticket...	$5 80	$7.27	$9.10

This is the half year of largest travel, under ordinary circumstances the ticket sales being as much as 30 per cent. greater in the last half of the year. The very low rates prevailed for but two months of it in 1884 and for five in 1885. We see that in 1885 when the price of tickets was 35 per cent. less than in 1883, the ticket sales were but 15 per cent. greater, while the earnings were 26 per cent. less. But what is more significant still, though the rate was 19 per cent. lower than in 1884, the ticket sales were 2½ per cent. *less.*

The reason doubtless was that the public appetite for low-priced Chicago tickets had been pretty well satiated. Naturally when rates are reduced by a railroad war, people hasten to take advantage of it, not knowing how long the low fares will last, and not expecting them to last long. Thus in a short railroad war the increase of travel is likely to be considerably greater than would follow the permanent application of the low rates of the war. In this case the war lasted so long that the special temporary stimulus was probably pretty nearly exhausted some time before it ended.

The course of the business in successive months is given below for the 18 months including the period of very low rates, tickets from New York to Chicago and points beyond:

1884:	No. tickets.	Receipts.	Av. rate.	1885:	No. tickets.	Receipts.	Av. rate.
July...	6,199½	$50,407	$8.13	April..	4.016	$18,589	$4.63
Aug....	5,021	40 199	8.01	May...	4.198	19,658	4.68
Sept...	5,205½	40,848	7.85	June..	4.734	21,563	4 55
Oct....	4.119½	30.381	7.37	July...	4 793½	20,402	4 26
Nov....	3.949½	29,609	4.98	Aug...	5,852½	27,853	4.76
Dec....	4,786½	21,029	4.40	Sept. .	5,624	33.227	5.91
1885:				Oct....	4,560	26 977	5.92
Jan....	3,696½	16,305	4.70	Nov...	3 225	19.377	6.01
Feb....	3,027½	13,631	4.50	Dec....	2,484	21,587	8 69
March.	4,115½	18,533	4.50				

Thus the largest number of tickets sold in any month of the whole period was in the July *before* the railroad war began, which, however, was doubtless entirely exceptional, and due to the national conventions held in Chicago that year. In the next July, with an average rate of $4.26 instead of $8.13, the sales were 21 per cent. less. After general reductions began, which was before the end of October, the sales increased greatly. Travel is less in November than in October usually, but in 1884 there were 133 passengers per day from New York to Chicago (at an average rate of $15.68 for the whole distance, the trunk-line proportion being 47 per cent. of the whole) and 198 per day in November, at an average rate of $10.60. But naturally this did not continue. The first month of the low fares was the month of the largest ticket sales of the entire 13 months that the low rates continued. The nearest approach to them was in August (189 per day) and September (187 per day) in 1885, just after the sale of the West Shore to the New York Central, and when it was known that the fares would be advanced, which doubtless caused many to make the journey then who would have made it later if they had expected the rates to be permanent. Let us compare the months of 1884, before the great reduction, with those of 1885, as follows:

	—No. tickets sold.—			—Average fare —		
	1885.	1884.	Inc. or Dec.	1885.	1884.	Dec
July.....	4,793	6.199 —	1,405	$4.26	$8.13	$3.97
August.... ...	5,853	5,021 +	832	4.76	8.01	3.25
September.... ..	5,624	5,206 +	418	5.91	7.85	1.94
October...	4,560	4,120 +	440	5.92	7.37	1.45

The July comparison is misleading, because of the exceptional cause of travel in that month in 1884: travel of course is not made less by reducing fares; but for the other three months the full effect of the reductions should have been felt. We find that the number of passengers from New York to Chicago was larger in 1885 than in 1884 by 16.6 per cent. (decrease in rate 40 per cent.), in September 8 per cent. (decrease in rate 25 per cent.), and in October 11 per cent. (decrease in rate 20 per cent.). For the entire three months the travel and earnings were:

	1885.	1886.	Inc. or Dec.	P. c.
No. tickets sold..... ...	16,037	14,347	+ 1.690	11.8
Receipts therefor.....	$88.057	$111.428	—$23,371	21.0
Average per ticket.....	$5.54	$7.77	— $2.23	29.0

All this demonstrates, what of course was known at the time by traffic men, that a great reduction in the price of a ticket to Chicago does not increase the travel enough to prevent a large decrease in gross, not to say net, earnings; but it shows definitely what was not very widely known among railroad men even before, what increase in travel is caused by a very large reduction in rates on a route like this. A reduction of nearly one-half in the price of tickets—more than one-half by some of the lines—was followed by an increase of 29 per cent. in the travel and by a decrease of 31½ per cent. in the gross earnings. During the whole year 1883, when rates were maintained, there were 86,194 passengers; during 1885, with 11 months of very low rates, there were 104,447—21 per cent. more.

Another important fact is shown by these figures, and that is that this travel, which is by far the most important long distance through travel in this country if not in the world, is after all but a small item in railroad earnings. In 1883, when rates were maintained, the trunk-line earnings from this travel first-class *to* and beyond Chicago were $788,890, and from second-class passengers in that direction $163,657, or a total of $952,547, and all the other travel from all the seaboard cities that goes beyond the western terminus of the trunk lines is estimated to yield little more than half as much more and their whole through travel in both directions, at full rates, about $3,000,000, which is only about 10 per cent. of the total passenger earnings of the New York Central, the Erie and the Pennsylvania in 1883. Now a reduction in the through fares does not by any means affect all other fares, but it does affect many of them, as is indicated by the decrease in total passenger earnings of some of the roads.

The average decrease in the through earnings for the year of the low rates applied to the through earnings in both directions of the three trunk lines mentioned would reduce them by something like 30 per cent., or $900,000. But the Pennsylvania Railroad alone suffered a decrease in total passenger earnings of $392,000 from 1884 to 1885, and of $431,000 from 1883 to 1885, its local traffic being affected much less than that of most roads by the through rates. The great decrease of $1,752,000 in the passenger earnings of the three New York-Buffalo roads which competed for through travel of course cannot be charged to the low through rates alone, this sum being probably about seven-eighths of their total earnings from through travel when rates are maintained. It must have been chiefly due to the direct competition for local traffic between the West Shore and the New York Central, which necessarily affected rates to many places to which the Erie tickets. It is plain, however, that a very considerable difference in the percentage of the through travel obtained by any given road would probably be much less than the loss in the earnings on other travel more or less affected by the strictly through rates.

HUNDRED-POUND RAILS.

The engraving to full scale of a 100-lb. rail section shown in another column is not, as there stated, presented with any expectation that it will be very speedily adopted as a standard by any line, nor would it be at all desirable to adopt even an 80-lb. or 90-lb. rail without greater certainty of a good quality of steel than is now customary. A 100-lb. rail of such poor steel as gets into so many modern rails would be an abomination. Quality granted, however, and it can be readily had by making an effort to insure it, perhaps there is no experiment which would be so promising or so thoroughly justified as for a road of heavy traffic to lay down 500 or 1,000 tons of just such a rail as that shown, with some modifications of section, at specially exposed points, and note the result.

For the universally recognized way of making experiments usefully and successfully is to make the contrast between the things to be compared as great as possible, to the end that the principle may be tested somewhat in extremes. There can be no doubt that the average American rail is uneconomically light for the service demanded of it, and always has been. Mr. Sandberg greatly exaggerates the contrast between American and English practice in that respect by not making sufficient allowance for the fact that our

ties are only 2 ft. apart here instead of 3 ft., and by including as one of the elements of stability the cast-iron chair which carries the English double-headed rail over their soft wood ties, which are not hard enough to stand the cutting of a flat-bottomed rail. Ties two feet apart do not give an effective span of 2 ft., to be sure, because the ties settle; but so do ties 3 ft. apart, and necessarily rather more in proportion, so that it is still right to regard the comparative spans as 2 to 3. The greater part of the contrast in English and American track practice is merely the natural result of difference of conditions; dear soft ties and cheap steel in the one case and cheap hard ties and comparatively dear steel in the other case requiring different combinations of the two to give the same stability at the lowest price.

Still, there is a solid sub-stratum of fact in Mr. Sandberg's contrast; light engines on heavy rails in England; heavy engines on light rails in America; especially as respects the engines, and when the comparative efficiency of the rails used at the joints is remembered, and it may well be that, as Mr. Sandberg suggests, if a 100-lb. rail were once used, the result would be so satisfactory that the users would never willingly go back to lighter rails.

It would be no heavier in proportion for general service than the 70-lb. rails which the Manhattan Elevated is now laying in place of its old 56-lb., and the contrast between these two as respects smoothness of motion is really extraordinary. Whereas every joint is on the light rail obtrusively conspicuous, on the heavy rail the joints are (at least while the rails are new) literally indistinguishable. The new rail, to be sure, is laid with a different joint, and it is open to any one to distribute the credit for the striking result between the joint and the rail section as he pleases; but without prejudice to the Fisher joint, which is used on the new rails so far laid, we must be pardoned for believing that the extra weight of section is much the larger factor of the two. Parallel sections laid with angle-bars will in time settle this question more definitely.

For a prosperous road the difference in the cost of even very heavy sections hardly explains the reluctance to use heavy sections. Let us suppose a 100-lb. rail used instead of 65-lb., on track with 50 trains a day over it. The extra rail required is 35 lbs. $\times \frac{11}{7} = 55$ tons per mile, which at $32 per ton for the *extra* metal (making the whole rail cost $33.62, with 65-lb. sections at $34.50) amounts to $1,760 per mile, interest on which, at 5 per cent., amounts to $88 per year. But from this capital investment is to be deducted the present worth of the future scrap value of this extra steel. At 5 per cent. compound interest this future scrap is worth now 45.81 per cent. of its future par value if the rails last 16 years, and 31.73 per cent. if the rails last 24 years. Scrap steel rails are now worth about 60 per cent. of the cost of new, but if we take it at only half, we should deduct something like 20 per cent. of the present cost as the present worth of the future scrap, leaving us only $70.40 per year as the actual cost of the extra steel, which amounts to 19.23 cents per day per mile, or 0.385 cents per train-mile.

Now, what does three-eighths of a cent per train-mile amount to if we really get an appreciably better and more easily maintained track and an appreciably smoother motion of trains? A road will now ordinarily spend—all roads, both great and small, as we showed in our issue of Dec. 4, 1885—something over 10 cents per train-mile on repairs of road-bed and track alone, exclusive of renewals of rails and ties and maintenance of bridges, buildings, signs, fences, crossings and all structures. Would not a 100-lb. rail instead of 65-lb. save $\frac{3}{80}$ of this? Would it not enable at least one man in twenty-seven to be dispensed with without loss? It is self-evident that it would, and much more, besides which, if a single additional passenger were attracted to the line every eighth trip of a train the cost of the improvement for passenger service would be defrayed.

There is, moreover, the additional gain in wear and tear of wheels, ties and rails, and in train resistance and hauling capacity to be considered, each of which separately would almost alone justify such an expense. For example, is it conceivable that such an improvement would not add *one ton* to the feasible average train-load of freight trains? If so, the average cost for hauling that ton alone would justify the expenditure, for although lower costs per ton per mile than 0.385 cents have been reported, yet they are very few. Only about half this cost would be really saved, it is true, if only one ton were added to the train-load, but it is certainly not an extravagant hypothesis that two or three or five tons might be added to it. It is entirely within the bounds of possibility that such a rail would save as much as 1 lb. per ton of resistance, especially on poorly maintained track.

The value received for the money—not in steel, but in the three qualities really wanted, stiffness, strength and durability—is immensely greater for heavy rails. We analyzed last year (March 13, 1885) the comparative value received from light and heavy rails, and for reasons given in that article an addition of only one-third to the investment in steel gives more than twice (2.37 times) as much stiffness and nearly twice (1.91 times) as much ultimate strength, with a very much greater gain yet in metal available for wear before the rail is worn down so as to be equally weak.

In the last ten or twenty years times have changed greatly, and we have not changed with them, it is quite certain, as much as would be wise. Steel is far cheaper and *can* be had just as good by taking pains to secure it; traffic is enormously greater, engines and cars are heavier and the end is not yet; competition is sharper, ideas of luxury and comfort have advanced, and the determination to have it at any cost if it can be had has certainly not fallen off. Bearing this and all that has preceded in mind: as between a 65-lb. rail and a 100-lb. rail, assuming there were no medium, which is true economy for a road of any considerable traffic? It seems very probable that for at least 20,000 miles if not 50,000 miles of track in the United States a 100-lb. rail is more economical than a 65-lb., assuming there were no medium.

There is, however, a medium, and any number of them, and the question, therefore, remains: As between a 100-lb. rail and an 80-lb. or 90-lb. rail, which is the most economical?

If one were called on to decide this question now for any long section of road, probably no one would hesitate. He would say at once that the lighter rails were, if not the most economical, certainly economical enough and by far the most prudent selection. As respects an order for an experimental five or ten miles the case is not so clear. For the very reason that we have argued the question of heavy rails at some advantage because we have, as it were, enlarged the scale of the argument by taking extreme weights, a practical test in the nature of a "feeler" as to what was going to be necessary and wise would be a far safer guide if it extended beyond the limits which were finally fixed on than if it stopped short of them. It is certainly a possibility that reasons would very soon appear why the section adopted merely as an experiment should be continued as a standard.

For after all, as between a 90-lb. and a 100-lb. rail what is there saved? Only 6.2 cents per day per mile of track in interest, or $1.25 in every 20 miles, and the rail is only 90 per cent. as stiff and 92.6 per cent. as strong. Is not that difference, including all the other contingencies, worth 6 cents per day per mile? Would it not save $\frac{1}{20}$ of a man per mile? Ties alone cost over $150 per mile of track on first-class roads, or 41 cents per day. Would not 10 per cent. more stiffness and 5 to 8 per cent. more bearing surface on the base go a long way to save the 6.2 cents per day that it costs in this item alone? If not, the still greater gain between 70 lbs. and 80 lbs. and between 80 lbs. and 90 lbs. ought unquestionably to pay, and the road which first adopts a 90-lb. standard rail will be very likely to play a winning card, if due care is exerted to get good quality.

In respect to quality, Mr. Sandberg's table of proposed tests seems to supply all that is lacking in the scheme of "Rational Tests for Rails" suggested in our issue of June 11. It will pretty certainly exclude all rails which are so brittle or so unhomogeneous as to be in danger of breaking in the track. It is not, however, entirely adequate for insuring good quality without other tests as well. For example, it is not only possible, but probable, that many rails which were too soft to retain their form properly under the impacts of service would pass these tests successfully. For that quality no test can be so satisfactory as the direct one of measuring the indentations which can be produced by known weights falling on a blunt-edged chisel, or some equivalent. Similarly, wearing qualities are not necessarily at all insured by tests for transverse strength. It is far better and safer to test it directly by letting two rails saw into each other as the wheel saws into the rail to produce wear, and measure the actual rate of abrasion; assuming that in both cases a standard has first been determined by testing rails of known good and bad quality as respects these two details.

It not unfrequently happens that an entirely sound conclusion is defended by entirely unsound arguments, and Mr. Sandberg's paper is a distinguished example of this in one respect. The table giving the average mileage of engines between shop repairs on the Great Western Railway, which appeared in our issue of March 12, 1886, is repeated in the paper and the conclusion drawn:

"If the comparative cost of renewal of rolling stock and of permanent way in countries where the opposite practices [to the light engines and heavy rails of England] be examined, the difference will be found to be enormous, for while English engines and carriages, through the perfection of the roads, need very small repairs in a year, American and Continental rolling stock *will probably have to be* [italics ours] in the repairing shops frequently and for long intervals, to say nothing of the cost of repairing the road."

So superficial a conclusion, on so slim a basis of fact, goes far to discredit the entire paper. We pointed out the inconclusiveness of the statistics in part in our issue of March 19. It should be needless to add further that the only fair criterions in this respect are three: Average mileage per year; average mileage life; average cost per ton-mile and passenger-mile for engine and road repairs. In the first American locomotives notoriously lead the world by an excess of fully 50 per cent. In the second it might be readily shown that they are certainly not behind. In the third direct comparison is impossible, because English railroad statistics omit the most vital of all units of comparison, ton and passenger mileage, but with the highest reasonable estimates of ton and passenger mileage, based on the receipts, it is readily shown that the American maintenance charges per ton or passenger mile are certainly much less and probably very much less even without allowing—as would be but fair—for the considerable differences in cost of labor and material.

Tensile Tests of Steel Rails.

We have been favored by Mr. J. D. Hawks, Chief Engineer of the Michigan Central Railroad, with the following records of tests of rails, which explain themselves, and it may be said with perfect truth explain nothing else—unless it may be the utter fatuity of using tests for rails which have no direct relation to the qualities desired, but only to qualities which in rails are unimportant, however important in bridges.

Bridge-builders and other designers of structural work in metal have for their own purposes devised certain tests for the qualities which they require in metals and certain machines for making the tests. The qualities which they require are primarily great resistance to static stresses of tension and compression, and their machines test thoroughly those qualities. Resistance to abrasion or to impact, beyond a certain minimum, are of no importance, and accordingly their machines do not test them at all.

In a rail these latter qualities are the very ones required, and if those who have to do with rails were as faithful and far-seeing as those who have to do with bridges they would long since have had, like the bridge men, machines to test directly the important qualities which they desire, in some such ways as were suggested in our discussion of "Rational Tests for Rails," in our issue of June 11, or such better ones as experience might indicate. Nothing of the kind has been done, however, so that when physical tests are wanted at all the only resource at the present moment is to rush off to the bridge-testing machines, and see if an intelligible result can be extracted from them. Is it to be wondered at that it rarely can be? Beyond a very partial success in Dr. C. B. Dudley's first comparative tests of broken and sound rails, in Thurston's torsion machine, we recall no instance in which the bridge-builder's physical tests have given any intelligible indication of the quality of rails, and in that case the measure of success attained was no doubt due to the fact that the tests had no reference to resistance to abrasion or deformation of section, but solely to fracture under strain. We have on hand a very large collection of these tests, on which we have done considerable work in the hope of extracting some shadow of evidence by large averages, but so far without success.

These, however, are chiefly European tests. Those below have a certain interest from the fact that they are on brands which are all familiar to trackmen and in very general use, although their value, as stated, is chiefly negative.

TABLE I.

RAIL STEEL OF EDGAR THOMSON STEEL WORKS.

(*Tests and Analyses made at the Works. Bars about ⅝ in. round.*)

No. of Test.	Physical Tests.				Chemical Tests.		
	Ultimate strength per sq. in.	Elastic limit per sq. in.	Elongation in 8 in.	Reduction of area	Carbon	Mn	Ph
	Lbs	Lbs.	Per c't.	Per c't.			
1	96,823	60,733	18.7	32.6	.370	.960	.100
2	96,126	58,920	18.0	30.5	.370	.960	.100
3	95,743	60,383	18.6	36.2	.360	.950	.100
4	94,282	59,543	19.8	35.8	.350	.940	.100
5	93,634	59,194	19.9	34.4	.340	.930	.100
Average	95,322	59,755	19.0	33.9	.358	.948	.100

TABLE II.

Tests of Tensile Strength Various Makes of Rails.

Arranged in order. Made by Detroit Bridge and Iron Works for J. D. Hawks, Chief Engineer of the Michigan Central Railroad, on entire rail-heads, cut from rails taken from Michigan Central tracks after more or less service, simply planing off the web. (Average specimen, 3 ft. long, and weight about ten times section.)

MAKE OF RAIL.	Area.	Ultimate strength per sq.in	Elastic limit per sq. in.	Elong a tion in 8 in.
	Sq. in.	Lbs.	Lbs.	Per cent.
N. C. R. M. Co., 1885*.	3.30	94,900*	59,200	6.26
N. C. R. M. Co., 1885.	3.32	93,400	61,600	.....
Cammel Sheffield toughened steel, 1881	2.70	81,000	.....	2.34
Cammel Sheffield toughened steel 1881	2.66	80,400	.....	1.56
A. & R. I. & S. Co. 1883	3.18	73 100	51,400	3.13
Edgar Thomson, 1883	3.35	70,300	.....	.....
A. & R. I. & S. Co	3.22	66,000	.....	2.34
Griswold & Co., 1872	2.55	63.200	.....	.....
John Brown Atlas, 1873.	2.56	60.500	.....	.....
Joliet, 1884	3.33	57,200	.....	.....
N. C. R. M. Co., 1875	2.81	54,600	.....	.....
C. I. Co., 1872	2.40	54,200	.....	.....
Joliet, 1884	3.30	53 500	.....	.....
C. I. Co., 1872	2.51	50.600	.....	.....
J. A. Griswold, 1872	2.26	45,300	.....	.....
Edgar Thomson, 1883	3.28	44,400	.....	.....
John Brown, Sheffield	2.42	43,500	.....	.....
N. C. R. M. Co	2.73	42,000	.....	.....

* This rail was tested to 90,000 lbs. per square inch and again to 78,000 lbs. per square inch, without breaking, the wedges of grip giving way both times. It was not broken on the final test, but had drawn down so much in the grip that the wedges were pulling through and resistance was diminishing.

The tests, it will be noted, were very differently made. Those in Table I. were on sample pieces turned to about ⅝ in. diameter (it is not even stated that they were cut from rail heads), and they were for rails which had never been in service. Those in Table II. were for rails which were in some cases practically new but in others had seen a dozen or more years of service, and in all cases they included the entire head of the rail, without other work being done on it than to plane off the web. The wear is rudely indicated by the area of the section, and great allowance should plainly be made for the effect of years of service on the molecular condition of the metal.

But after making all allowances the contrast is striking. It will be seen that only in four or five cases was there enough elongation to be worth determining. The record shows, as appears also from a box of the broken specimens in this office, that for the most part they broke short off like a piece of cast iron, except for the higher strain. This does not by any means necessarily imply that the rails are bad, as it would if they were eye-bars; on the contrary, we know that some of them which are far down on the lists were very good indeed, while others, which are well up in it, were passably bad.

What it shows is the futility of the method. The true moral of the tests is indicated by what Mr. Hawks says in his accompanying note: "The more I see of our poor steel rails, the more I am convinced that the tests are too much like those for wire rope or cable, and that tests suitable for wire rope are not suitable for steel rails."

The Survival of the Fittest Car Coupler.

We give an account in another column of the New York state car-coupler trials. It will be noticed that 33 couplers were tried, 16 of which had been tested at Buffalo nine months previously. The remaining 17 couplers were of comparatively recent invention, and the majority were either utterly unknown or not invented at the date of the Buffalo tests. But the fact that out of the 42 tried at Buffalo no less than 26 do not present themselves for trial at Albany nine months afterwards affords food for reflection.

If it be granted that all couplers not represented at Albany are practically abandoned by their representatives, it follows that 26 out of 42 couplers have died within nine months, a truly terrific mortality, which suggests that the law of the survival of the fittest finds a striking example in the case of car couplers. Thirty-three couplers in all were tried at Albany, so that 17 new couplers came to take the place of the 26 dead couplers. The following table shows the distribution of the births and deaths in the car-coupler world, arranged according to classes:

Table showing the Vital Statistics of the Car Coupler World, as exhibited by the number of devices shown on cars at Buffalo, Sept. 15 to 18, 1885, and at Albany, June 16 and 17, 1886.

Class of coupler.	Total number living Buffalo, Sept., 1885.	Survived till Albany, June, 1886.	Born since Buffalo and alive at Albany.	Total number shown at Albany.
Loose link	19	8	11	19
Fixed link	2	1	..	1
Vertical planes } Janney type.	9	5	2	7
Vertical planes } Miller type.	3	2	..	2
Loose-coupling bars	3	..	..	..
Hooks or links rotating vertically	3	..	3	3
Unclassified	3	..	1	1
Total	42	16	17	33

It will thus be seen that the greatest mortality has occurred among the three latter classes, all nine representatives of which were dead at Albany, though four fresh representatives of these types appeared. The loose-link class, though it had experienced a sad and terrible mortality, losing more than half its members, has received an equal number of recruits, and is still numerically the strongest regiment. The fixed-link class is even more select than at Buffalo, and it seems strange that inventors seem to fight shy of so promising a task as producing a new fixed-link coupler.

The mortality in the two types of vertical plane couplers has been less than in any other class, the percentages of loss being as follows:

Vertical plane, Miller type	33
" " Janney type	44
Fixed link	50
Loose link	58
All other classes	100

The figures are somewhat significant and should warn intending inventors of the many chances of failure. Some 4,000 couplers are said to have been patented, and only ¼ of 1 per cent. are ready for a trial. If the same rate of mortality continues, only 13 of those exhibited at Albany will be prepared for a trial in March, 1887. This mortality is not exceptional. Of the numerous couplers tried before the Massachusetts Railway Commissioners in September, 1884, only nine survived to be tried at Albany. In all 173 couplers were entered for competition at Boston, but many of them existed then only in model form, and could not be subjected to any tests. The Committee of the Master Car-Builders' Association was fully justified in expecting that the survival of the fittest would leave a diminished number of couplers to continue the contest. We can only hope that Darwin's great law may be fully carried out, and that the best devices may live the longest and secure universal adoption.

May earnings have been reported to date by 66 railroads, whose aggregates were:

	1886.	1885.	Increase.	P.c.
Earnings	$22,249,349	$20,999,958	$1.249,391	6.0

This is a respectable increase; but it is an increase over a very unfavorable year, for the May earnings of the 75 roads reporting in 1885 were 8.8 per cent. less than in 1884, and though those of the 71 roads reporting in 1884 were 5 per cent. more than in 1883, there was an increase of 8.3 per cent. in mileage then.

Some of the more noticeable roads besides those noted two weeks ago have had the following earnings in May in successive years:

	1883	1884.	1885.	1886.
K. C. Ft. S. & G.	$107,566	$145,097	$196,290	$199,085	$173,296
Wis. Cen.	126,357	119,039	123,066	120,062	114,646
Grand Trunk	1,402,616	1,227.003	1,094,198	1,228,681
Nash., C. & St. L.	154,163	171,079	190,751	167.495	172,329
Rich. & Danv.	263,380	297,287	299,329	292.077	276,400
Ala. Gt. So.	54,853	78,359	88,543	78,224	78,275
C., N. O. & T. P.	208,210	208,208	219,147	187,247	195 232
S. Carolina	74,248	75 089	74.660	58.104	58,416
Va. Midland	119,228	137,765	137,363	119,339	117,023

The Fort Scott & Gulf earned 13 per cent. less than last year and 11½ per cent. less than in 1884; the Wisconsin Central a little less than in any other year reported. The Grand Trunk earned 12 per cent. more than last year, the same as in 1884, and 12½ per cent. less than in 1883. The Southern roads have some a small gain and others a loss compared with last year, but all without exception have a considerable decrease from 1884.

The chief gains were reported two weeks ago, and they outweigh the decreases materially.

Further investigation shows that the shipments of freight from New York over the Lehigh Valley Railroad were not larger in May than in previous months, and that they have not at any time been large enough to affect much the comparisons of this year's reported total shipments with those of previous years. Consequently, there was actually a very large decrease in the through rail shipments from New York to the West last May, compared with several years previous.

Compared with most previous years, the canal opened earlier this year, and, naturally, the canal has taken more freight from New York this year than it did last, when the rates were 30 per cent. lower than now; but in most previous years the rail rates were as high as this year, while the rail shipments were much smaller this year.

The most recent returns show a somewhat irregular movement from New York, but from New York, Philadelphia and Baltimore the aggregate shipments have been pretty steady, as follows, in tons:

Week ending			
May 22.	May 29.	June 5.	June 12.
29,056	29,821	28,598	30,803

In the first two weeks of May the shipments from New York were unusually small, but they have recovered since.

The comparison with last year we could not expect to be favorable since May, as it was June 1 that the second great reduction in west-bound rates was made, leaving them about 47 per cent. lower than now or in most previous years. The reduction of 30 per cent. made near the first of January was not followed by any considerable increase in shipments over 1884, but after the June reduction the increase was larger, probably because it diverted shipments from the canal. The average *weekly* shipments in June from these three places have been in tons:

1881.	1882.	1883.	1884.	1885.
29,329	40,103	27,748	28,266	32,422

while for the two weeks ending June 12 this year they were 29,700 tons a week, which is more than the June average when rates were maintained, but is 8¼ per cent. less than last year. From New York, whose shipments are most significant of the general condition of trade, because they include the more valuable goods, the average was 23,705 tons per week last year in June, and 20,487 for the two weeks to June 12 this year, a decrease of 13½ per cent. It would naturally be larger in New York than elsewhere, because New York alone has canal shipments which can be diverted by low rates.

On the whole, the recent shipments this year are very satisfactory, and much larger than was indicated by the course of shipments from New York in May, and especially in the first half of May. Substantially, the shipments are as large as they ever were at this season when rates were maintained.

May Accidents.

Our record of train accidents in May, given on another page, contains notes of 27 collisions, 58 derailments and 8 other accidents; a total of 93 accidents, in which 23 persons were killed and 170 injured.

Three collisions, 6 derailments and 4 other accidents caused the death of one or more persons each; 9 collisions 23 derailments and 2 other accidents caused injury to persons, but not death. In all, 13 accidents caused death and 34 injuries, leaving 46, or 49 per cent. of the whole number, in which there was no injury serious enough for record.

The 27 collisions killed 8 and injured 85 persons; the 58 derailments killed 8 and injured 62, while in the 3 other accidents 7 persons were killed and 23 injured.

Of the killed 17 and of the injured 74 were railroad employés, who thus furnished 74 per cent. of the killed, 43½ per cent. of the injured and 47 per cent. of the whole number of casualties.

As compared with May, 1885, there was an increase of 31 accidents, of 15 killed and of 105 injured.

These accidents may be classed as to their nature and causes as follows:

COLLISIONS:		
Rear	17	
Butting	8	
Crossing	2	
		— 27
DERAILMENTS:		
Broken rail	5	
Broken frog	2	
Spreading of rails	10	
Broken wheel	2	
Broken axle	5	
Broken brake beam	1	
Accidental obstruction	2	
Cattle	7	
Land-slide	1	
Wash-out	7	
Misplaced switch	5	
Purposely misplaced switch	1	
Malicious obstruction	1	
Unexplained	9	
		— 58
OTHER ACCIDENTS:		
Boiler explosions	4	
Cylinder head blown out	1	
Broken tire	1	
Powder explosion	1	
Accidental obstruction	1	
		— 8
Total number of accidents		93

No less than 10 collisions were caused by trains breaking in two; three were due to misplaced switches, and one to cars blown out of a siding by a gale.

A general classification of these accidents is made as follows:

	Collisions.	Derailments.	Other.	Total.
Defects of road	..	17	..	17
Defects of equipment	10	8	6	24
Negligence in operating	16	5	..	21
Unforeseen obstructions	1	17	2	20
Maliciously caused	..	2	.	2
Unexplained	..	9	..	9
Total	27	58	8	93

Negligence in operating is thus charged with 22½ per cent. of all the accidents, defects of road with 18, and defects o equipment with 26 per cent.

A division according to classes of trains and accidents is as follows:

Accidents:	Collisions.	Derailments.	Other.	Total.
To passenger trains	1	18	3	22
To a pass. and a freight	8	..	..	8
To freight trains	18	40	5	63
Total	27	58	8	93

This shows accidents to a total of 120 trains, of which 31 (26 per cent.) were passenger trains and 89 (74 per cent.) were freight trains.

Of the total number of accidents 52 are recorded as happening in daylight and 41 at night.

The month, generally a light one, shows an unusual number of accidents. Some of the increase was due to storms and heavy rain, while part of it cannot be held to result from

the weather. It is worthy of note that nearly all the washouts resulted from a single storm.

The largest number of casualties reported was in a collision on the Grand Trunk, resulting from a passenger train breaking in two—a very unusual occurrence. Nearly all the injuries in this case were slight, however, and the most serious and fatal accident of the year was caused by a boiler exploding just as the engine was going out of a crowded roundhouse.

For the year ending with May the record is as follows:

	Accidents.	Killed.	Injured.
June	75	24	115
July	76	28	75
August	92	37	172
September	91	25	98
October	123	36	134
November	96	19	118
December	74	31	153
January	94	40	90
February	98	21	157
March	81	49	131
April	66	23	105
May	93	23	170
Total	1,059	356	1,518
Total, same months, 1884–85	1,245	341	1,605
" " " 1883–84	1,456	445	2,020
" " " 1882–83	1,585	428	1,786

The yearly average for the four years was 1,336 accidents, 393 killed and 1,732 hurt The monthly average for the year was 88 accidents, 30 killed and 127 injured.

The averages per day were, for the month, 3.00 accidents, 0.74 killed and 5.48 hurt; for the year, 2.90 accidents, 0.98 killed and 4.16 injured.

The average casualties per accident for the month were 0.244 killed and 1.828 hurt; for the year they were 0.336 killed and 1.433 injured.

The month was thus above the averages for the year, except in the number killed. This is unusual, for May is generally a light month for accidents of all kinds.

The New York State Car Coupler Trials.

The car coupler trials held by the Railroad Commissioners for the state of New York took place at Albany on the 16th and 17th inst. An account of the proceedings on the 16th has already appeared in the *Railroad Gazette* and the trials on the second day are described in another part of this issue. The renewed trials on the 17th were conducted in the same method, with one important exception. On both days the Commissioners tested each coupler to ascertain if it would couple automatically with a link in a common draw-head. On the 16th the draw-head used was about 2½ in. lower than the standard, and had an open throat, so that the link could be driven back some distance. On the 17th a Safford draw-head was used, the difference in level being only about 1½ in. This draw-head had a closed throat, so that the link could not be driven back. The results obtained by this alteration were remarkable. On the 16th none of the couplers succeeded in coupling automatically with the standard link. On the 17th nearly all those tried performed this feat successfully. It certainly appears that the same common draw-head should have been used throughout in order to make a fair comparison on this very important point. As the results now stand, any comparison between the couplers tried on the 16th and those tried on the 17th is impossible as regards the ease with which they will couple automatically with a link in a common draw-head.

It is hardly necessary to observe that nearly every one of the 4,000 odd car couplers patented would couple and uncouple with its own kind, and that most of them can be set not to couple, and that the fact that a coupler passed these easy tests on a piece of straight track merely shows that the coupler does what every coupler should do, and does not show that the coupler has any transcendent merits that entitle it to special recognition. Some authorities on the matter contend that an occasional failure to couple automatically is not a serious defect in a coupler, and that in making up a train, if the cars do not couple at the first time of asking, the brakeman can easily signal the engineer to back them together again. There is some truth in this argument, but if a brakeman at night sends two parts of his train together and apparently a coupling is effected, some awkward results might follow is he found out two or three miles afterward that no such coupling had been effected, and certain cars were consequently left behind on the side track.

Two very important points as to the merits of a coupler cannot be tested in a hasty trial. It is impossible to ascertain by anything short of extended experience whether a certain coupler is occasionally liable to come apart while running, and whether it is apt to jam and refuse to be uncoupled. When tested, the couplers are new and in first-rate order, and therefore neither of these contingencies is likely to arise, but in actual practice it is well known that such cases continually occur. We heard recently of a case in which a car fitted with a well-known coupler was sent from New York to Fishkill, but on arriving at the latter point it was found impossible to uncouple the car, which was accordingly taken on to Albany.

The New York Railroad Commissioners, though, of course, unable to test the above-mentioned points in a few hours' trial, paid a good deal of attention to some other features that are too often neglected. The manner in which the dead-blocks are arranged, and the precautions taken to make the coupler act properly in buffing and keep the cars a certain safe distance apart, are matters that too many car-coupler inventors seem to think beneath their notice. Many couplers are so arranged that the buffing is entirely taken by the springs, and when these break there is nothing to prevent the cars closing and crushing the unfortunate man who happens to be in the way. Other patent draw-heads, again, instead of having a flat face that will bear against the end sill when forced back, and so offer a considerable resistance, have a taper part joining the head and shank of the coupler. When forced back, this taper bears against the under side of the end sill, and of course tends to force the whole draw-head downwards. After a few days running such a draw-head will be below the standard height, and a few heavy bumps from a big Consolidation engine will then either break the springs or force the whole draw timbers off. Several couplers very effectually guard against this mishap. The United States coupler may be taken as an example. When forced back by a heavy bump, the heavy upper part of the draw-head bears fair and square against the end sill, and the buffing strain is transmitted in a direct line with the sills, relieving the draw-timbers and bolts. The rapid adoption of this coupler in New England is probably largely due to the durability and safety given by this feature. Too many car coupler designers are apt to imagine that the whole duty of a coupler is to couple, but this is a great mistake. The Irishman who stepped off the roof of a six-story house and landed on the sidewalk was perfectly right in saying that it wasn't the fall that hurt him, but the sudden stop. And Pat's words have a direct bearing on the car coupler question. It is the sudden stop in buffing that does a great deal of the mischief. The saving in springs and draw gear effected by taking any excessive strains direct on the sills is a very important item. Couplers which soon droop below the standard height and are often knocked off will soon get out of favor and be beaten in the race by a coupler which keeps its head up. The ability to keep the cars apart as well as to hold them together is essential both for safety and durability.

Another very important point is the arrangement of the handles for working the coupler. Many of the car coupler inventors appear to consider this a matter of small importance, but it is really a difficult matter to so arrange the handles that the coupling or uncoupling can be effected from either side of the car, and that the levers, etc., do not project so as to injure the men either going between the cars or walking alongside the train. The advisability of arranging the handles so that a car can be left set not to couple increases the difficulty, while many railroad men would prefer having handles that after once being set require no further attention. This is very convenient in handling a train. A brakeman or yardman walking a longside his train draws a pin at intervals, and when the engine starts the train is separated without any further attention. But in many couplers, there is no rest or catch for the handle of the lever working the dog or pin, and consequently the brakeman would have to hold the handle until the cars are actually pulled clear apart.

A uniform method of working the handles operating the couplers is also very desirable. At present the handles of some couplers have to be turned and pulled, and lifted and dropped in all sorts of different fashions, which would puzzle an unfortunate brakeman considerably on a dark night with a train equipped with several different styles of couplers.

Any arrangement of handles adopted should be durable, as well as efficient. This seems so evident that many of our readers will consider it unnecessary to state such a proposition.

However, even the most experienced car-coupler men appear to have not yet fully appreciated the great importance of well designed and durable handles. The Ames and Janney couplers have both been prominently before the railroad public for many years, are both used on a large number of cars and have both repeatedly received the approbation of the Master Car-Builders' Association; yet in spite of their high standing, the representatives at Albany of both of these couplers had to apologize for some shortcomings of their respective couplers, and gave very similar reasons. The couplers were all right, but in the case of the Ames, the latest arrangement of handles was not fitted, and in the Janney the arrangement of handles was altogether unusual and was totally different from that which the makers of the draw-head recommended. The importance of the question of levers and handles for working, and the way in which it is neglected, could hardly receive a stronger illustration. These may seem matters of detail, but all great questions are composed of details, and the collection of the best details generally makes the best machine as a whole.

Twenty-one couplers were tried during the first day's proceedings at Albany, and twelve during the second day, making 33 in all—a smaller number than had been expected, and nine less than the whole number of those tried at Buffalo by the Executive Committee of the Master Car-Builders' Association, Sept. 15 to 18, 1885. It will be seen that several couplers tried at Buffalo were not represented at Albany, having been apparently abandoned by their inventors. On the other hand, several new couplers appear, and many of the couplers tried at Buffalo reappear in an improved form, so that the general standard of excellence was decidedly raised. The average merit of the couplers at Albany may be said to have been better than that of those shown at Buffalo, and few of the couplers shown were manifest absurdities.

Among well-known couplers that were not represented at Albany may be mentioned the Gifford, the Hilliard, the Wilson-Walker, the Conway-Ball and the Joo, all of which have enjoyed in their day a certain amount of éclat. Possibly the absence of some of these couplers was accidental.

Pennsylvania Railroad Earnings in May.

The Pennsylvania railroad earnings in May are fairly favorable, the gain in gross earnings east of Pittsburg and Erie having been a little above the average gain this year, and the gain in net somewhat less.

For 14 years past the earnings of all the lines east of Pittsburgh have been:

Year.	Gross earnings.	Expenses.	Net earnings.
1873	$3,706,802	$2,750,028	$947,775
1874	3,261,456	2,102,099	1,159,357
1875	2,633,922	1,790,620	845,702
1876	2,982,245	2,099,565	882,680
1877	2,583,447	1,593,943	989,504
1878	2,503,441	1,529,911	973,530
1879	2,708,696	1,674,603	1,034,093
1880	3,417,915	1,941,063	1,476,852
1881	3,856,897	2,168,287	1,688,610
1882	4,108,877	2,342,088	1,766,789
1883	4,303,006	2,694,332	1,608,674
1884	4,267,173	2,627,679	1,639,494
1885	3,890,469	2,535,174	1,355,295
1886	4,178,580	2,705,878	1,472,702

Compared with last year the gains are:

	Gross earnings.	Expenses.	Net earn'gs.
Amount	$288,111	$170,704	$117,407
Per cent	7.4	6.7	8.7

These are large gains for an old road, and if the earnings had not been very unfavorable last year they would be very satisfactory, but the gross earnings were after all less than in 1883 and 1884, and the net earnings were smaller than in any of the five years from 1880 to 1884.

Meanwhile the lines *west* of Pittsburgh and Erie have had the following surplus over or deficiency in meeting all their liabilities in the month of May:

1879	Deficit,	$219,733	1883	Deficit,	$9,058
1880	"	22,947	1884	"	143,657
1881	Surplus,	143,658	1885	"	274,183
1882	Deficit,	75,586	1886	"	247,485

May has been a peculiarly unfavorable month for the Western system, which in only one of these years has earned the charges against it in that month, though in several there was a considerable surplus in the preceding and following months. The deficit this year in May is but $26,698 less than last year and larger than in any other year, so that the Western system has had but a small share of the improvement on the Eastern system, and the profits from the two systems have been, in May:

1879	$814,360	1883	$1,599,616
1880	1,453,905	1884	1,495,837
1881	1,832,268	1885	1,081,112
1882	1,991,203	1886	1,225,117

The gain over last year is considerable (13 per cent.), but the profits remain far below those of any previous year since 1879; 18 per cent. less than in 1884, 23 per cent. less than in 1883, and 33 per cent. less than in 1881, when they were largest.

For the five months ending with May the earnings and expenses of the lines east of Pittsburgh and Erie have been for ten successive years:

	Gross earnings.	Expenses.	Net earnings.
1877	$11,890,220	$7,994,149	$3,896,071
1878	12,071,738	7,630,173	4,441,565
1879	13,023,249	7,778,588	5,244,661
1880	16,212 596	9,130,634	7,081,962
1881	17,746,400	10 237,991	7,508,413
1882	18,557.096	11,901,503	6,555,593
1883	20,195,713	12,856,225	7,339,488
1884	19.427,080	12,398,080	7,029,020
1885	17,583,959	11 973.740	5,610,219
1886	18,914,067	12,595,772	6,318,295

The increases this year over last are:

	Gross earnings.	Expenses.	Net earnings.
Amount	$1,330,108	$622,032	$708,076
Per cent	7.6	5.2	12.5

An increase of one-eighth in net earnings seems enormous, and it certainly is a great improvement; yet the net earnings this year were less than in any of the five years from 1880 to 1884, and the decrease from 1884 is as large as the increase from 1885.

The gross earnings this year, however, were exceeded only in 1883 and 1884, the working expenses having increased greatly since 1882, and being larger this year than in any other except 1883.

The surplus or deficit of the lines *west* of Pittsburgh and Erie for the five months ending with May has been:

1879—Deficit	$166,950	1883—Surplus	$291,964
1880—Surplus	1,204,230	1884—Deficit	452,948
1881— "	1,553,769	1885— "	652,273
1882—Deficit	68,315	1886— "	434,798

The deficit is materially smaller this year than last, but the gain of $217,475 is much less than was to be expected from so great a system, considering the higher through rates. That it was no greater may be due to more liberal expenditures.

Combining the surplus or deficit of the western system with the net earnings of the eastern system, we have as the Pennsylvania's income from both systems for the five months:

1879	$5,077,711	1883	$7,731,452
1880	8,376,192	1884	6,576,072
1881	9,062,182	1885	4,957,946
1882	6,487,278	1886	5,883,497

Here we have a gain of $925,551 over last year for the five months, which is a little less than 1 per cent. on the stock outstanding. Yet the amount this year is $692,575 less than in 1884, $1,847,955 less than in 1883, and $3,178,685 less than in 1881. The decrease from 1881 is equal to 4 per cent. on the stock then outstanding, and the decrease from 1883 to 2¼ per cent.

Last year the earnings of this road continued to be much less than in 1884 until September. The decrease was not as large in June as in preceding and following months; but for three years net earnings have been extraordinarily small in June. Last year and the year before they were a third less in June than in May, in 1883 more than a fourth less. A little change in the time of making certain renewals or in the movement of some traffic, such as occurs sometimes, might make a great difference in this. If the net earnings should be as large in June as they were in May this year they would be 38 per cent. more than last year, and the fact that the working expenses were unusually large this year in

May (the season being early and making it possible to make certain renewals sooner than usual) makes it more probable that they will be smaller than usual in June.

Lake rates from Chicago to Buffalo, after having fallen off some ten days ago to 2½ cents for wheat and 2¼ for corn from Chicago to Buffalo, rose before the end of last week to 3 and 2¾ and Monday were ¼ higher. Canal rates for about two weeks have been down to 3¼ for wheat and 3 for corn from Buffalo to New York. The lake rates are much above the average at this time of year, but the canal rates are about as low as the lowest ever known. The shipments of grain by canal have been the larger part of the whole shipments from Buffalo, but not of the whole New York receipts, and are small in comparison with the canal shipments in some previous years. The lake and canal rate from Chicago to New York is now about 7½ cents a bushel, including the Buffalo transfer, against the regular rail rate of 15. Since in spite of this the rail movement is a very considerable part of the whole, it might indicate that the grain going by rail is mostly taken at cut rates, but for the fact that most of this rail grain is oats (in the week to July 12 1,408,268 bushels out of 1,981,891) which is too bulky to ship to advantage by lake. It is, however, probable that a very large part of the rail grain shipments *from Chicago* are taken at something less than the 25-cent rates, as this is the only freight which can be secured in considerable quantities by a reduction in rates, and the whole amount going by rail thence is not very large. In the week in question, while 83⅞ per cent. of the entire Northwestern shipments of oats were by rail, all but 24½ per cent. of the corn and 17 per cent. of the wheat went by water; and the railroads carried only 34 per cent. of the flour, of which they have in previous years usually had two-thirds or three-fourths.

The cotton acreage planted this year is estimated by *Bradstreet's* on the basis of 1,357 correspondents reports in 644 of the 659 counties which planted more than 500 acres last year as 17,864,937 acres, against 17,920,914 last year—practically the same both years. There is a decrease of 2½ per cent. in Georgia and 9 per cent. in Alabama, and small decreases in Florida (which is not much of a cotton state) and Tennessee. There are gains of 2 per cent. in Mississippi, 7⅛ in Louisiana and 4½ per cent. in Texas, and small gains in both the Carolinas and Arkansas. The three cotton states west of the Mississippi have 6,011,497 acres this year, which is 231,256 acres or 4 per cent. more than they had last year, while the states east of the Mississippi have 11,853,440 acres, which is 287,233 acres (2½ per cent.) less than last year. There is no such unoccupied fertile territory fitted for the extension of cotton cultivation as there is for the extension of grain cultivation, but the area occupied by cotton in the oldest states is but a very small fraction of the whole area. Thus Georgia, next to Texas the greatest producer of cotton, whose total area is 37,747,000 acres, had 3,081,842 acres of cotton last year, or less than one-twelfth of its area, while it had 2,857,700 acres of corn, 709,640 of oats and 453,375 of wheat, one-third more land in grain than in cotton. In the ten cotton states, beginning with North Carolina, Tennessee and Arkansas on the north, and taking all south of them, there were last year 28,609,000 acres of grain, against 17,722,000 of cotton, 61¼ per cent. more grain than cotton. Two of these states, however, grow much less cotton in proportion to area than those further south, namely, North Carolina, with nearly four times as much grain as cotton, and Tennessee, with six times as much grain as cotton. Taking out these, the other eight more purely cotton states had 15,862,367 acres of cotton against 19,416,701 of the three grains.

The American Society of Civil Engineers in its convention circular illustrates to a still doubting world the advantages of the 24 o'clock system, as follows:

"The special train will leave New York (Grand Central Depot) at 10.00 *sharp* on Tuesday, June 29, as a second section of the limited express, and will pass the following places a little after the times stated: Albany, 13.10; Syracuse, 17.00; Buffalo, 19.45, central time; Erie, 22.00; Cleveland, 24.25 Wednesday morning; Toledo, 3:30; Elkhart, 6.50; Chicago, arrive, 10.20, leave 14.00; Burlington, 21.00; Pacific Junction, 8.25 Thursday; Plattsmouth, 8.50; Oxford, 19.20; McCook (arrive), 21:45 central time; (leave) 20.55 mountain time, Thursday; Denver, 7.00 Friday morning."

This is, we believe, the first corporation to adopt the system in the East, although it is already in full operation on Canadian Pacific, and some few other lines have adopted it or purpose to.

The American Brake Company informs us by letter of June 22 that the fire which occurred at the Missouri Car and Foundry Works in St. Louis, on the 19th inst., destroying the cars which were being built for it to participate in the freight train brake tests at Burlington, Iowa, July 13, will possibly prevent its being on the ground at the beginning of the test, but it "has arranged to have other cars built, and will be there before the test is completed."

The time left is now certainly very short for preparing fifty cars for the tests anew, but it will be so very unfortunate that so prominent a competitor as the American Brake Company should be absent from any part of the tests, that, if the other competitors can be induced to consent, it would seem to be a case warranting are asonable further postponement of the tests, to enable the American Brake Company to repair the consequences of this fire. One of the chief ends of the tests is to afford some definite evidence of the comparative efficiency of buffer brakes, and if the company which has so far been the leading representative of that type of brake is to be absent from any part of the tests, their value and decisiveness will be very greatly diminished.

It is reported that trouble is arising at the new Mersey tunnel from a rather unusual cause. Immense quantities of water flow into the drainage shafts, and have to be continually pumped out. This water brings in with it considerable quantities of sand, mud and gravel, and as a consequence the foundations of several blocks of buildings in Liverpool have been affected, and the same trouble is now occurring in Beckwith street, Birkenhead. The water probably comes from land springs, as during construction the tunnel was so dry as to be dusty—a singular phenomenon under n river 100 ft. deep at high water.

Record of New Railroad Construction.

Information of the laying of track on new railroad lines is given in the current number of the *Railroad Gazette* as follows:

Chicago, Burlington & Northern.—An increase of 23½ miles at various points is reported.

Florida Southern.—Extended southward to Punta Garda (Charlotte Harbor), Fla., 42 miles.

Marquette, Houghton & Ontonagon.—A branch is completed from Negaunee, Mich., southeast 2½ miles.

This is a total of 68 miles on 3 lines, making in all 1,271 miles thus far reported for the current year. The new track reported to the corresponding date for 15 years has been:

	Miles.		Miles.		Miles.
1886	1,271	1881	1,972	1876	673
1885	677	1880	1,899	1875	407
1884	1,104	1879	761	1874	637
1883	1,966	1878	606	1873	1,408
1882	4,166	1877	618	1872	2,491

These figures include *main track only*, second or other additional tracks and sidings not being counted.

NEW PUBLICATIONS.

Standard Sections for Steel Rails and Splice-Bars. Designed by Wm. R. Jones, General Superintendent, Edgar Thomson Steel Works.

This handsome folio is a reprint of a paper before the Engineers' Society of Western Pennsylvania, read by the author, accompanied by a series of full-scale designs for standard rail sections for all weights varying by 2 lbs. per yard from 50 to 75 lbs. per yard, inclusive. Splice-bars are also shown varying from 26 lbs. to 41 lbs. per pair, those for 56-lb. rails weighing 30 lbs.; 60-lb. rails, 32 lbs.; 66-lb. rails, 35 lbs., etc.

The general proportions of the sections are somewhat similar to those of the old Pennsylvania standard 66-lb. rail as respects the distribution of metal between head, web and flange, but with several differences of detail. The later Pennsylvania sections are quite a departure from this in respect to having a great deal of metal in the head and comparatively little in the web and flange. This Mr. Jones objects to with no little force as bringing the neutral axis too near the top for safety, especially as the web and flange have naturally less ductility because of the colder rolling due to less metal. Mr. Jones says that he "knows it is an absolute fact that in rolling rails of improper design great strains are imbedded in rails, owing to the unequal distribution of metal and the contortions to which rails are subjected in cooling." A fact tending in the other direction, however, for which Mr. Jones perhaps has not allowed sufficiently, is that as rails become much worn they are particularly liable to break, owing to deterioration at the joints and internal changes of structure due to vibration and hard service as well as to direct loss of metal, and that with old rails the loss of metal on the head affects materially the position of the neutral axis. Take off ⅜ or ½ in. from the head of the proposed sections to represent wear, and their appearance as respects good distribution of metal for strength is seriously injured—much more seriously than is the case with new rails with their large heads and thin flanges, because the latter when worn have symmetrical sections, whereas those which were symmetrical in the beginning have an excess in the flanges.

Noticeable details of the designs are: The comparatively broad edge to the flange, to avoid cutting into the spikes, while at the same time the lower corner is very slightly rounded, to avoid cutting into the tie; the very sharp corner at the bottom of the head, adopted with a view of giving as much bearing surface as possible to the fish-plate; the flaring sides of the rail, in the Pennsylvania and Lehigh Valley style, which has the advantage of giving more bearing surface to the fish-plate, but is otherwise a worse than useless waste of metal to the extent of something like 10 per cent. of the metal in the head; and the rounding off of the upper corner to a half-inch radius, "adopted to meet the views of the master car-builders," Mr. Jones puts it, although the master car-builders, with the exception of a few members of their Association, have expressed no views on that subject, and the experience with that detail recorded in our issue of June 18 does not seem to favor it. Mr. Jones also calls attention favorably to the device of Messrs. Bridges & Good, of the Pennsylvania Railroad, by which about 8 in. of bearing surface only is left for the fish-plate against the rail, the ends being planed away, thus adding something of the Fisher bridge principle to the fish-plate type, but certainly with very inferior bearing surfaces, both of the rail on the fish-plate and of the fish-plate on the tie. Mr. Jones justly adds:

"With the old fish-bar it is not an easy matter to take up the lost motion, because the larger portion of the fish-bar is not worn. By using Bridges & Good's joint the lost motion can be readily taken up."

If for "not easy" Mr. Jones had written "impossible," it would have been more strictly in accordance with the facts. As respects the question of breakage of angle-bars, he adds:

"From my own observation, and from knowledge I have gained from road-masters, I know that a large percentage, in fact too large, of fish-bars break in the track. I have seen two sections of track on two Western roads where over 50 per cent. of the fish-bars were broken. I have seen any number with the angle portion of the bar broken and the angle lying alongside of the track. This has grown to be a shameful evil, and it is evident that one reason is that the fish-bars are not properly designed to meet the requirements of actual service, and it is also evident that the material used in making the bars is totally unfit."

Mr. Jones suggests steel instead of iron, but we believe the many experiments in that direction have not had particularly fortunate results, and it is at least an open question whether the numerous failures of the fish-plate do not arise from incurable faults of the type, rather than from imperfections of material or bad details of design, although these no doubt help.

Poor's Directory of Railway Officials and Railway Directors. 1886. First annual number. Poor's Railroad Manual Co., New York.

The least that can be said for this publication is that if it is as accurate as it is comprehensive—and we see no reason to question that it is as accurate as can reasonably be expected especially in a first publication—it is far ahead of any publication of the kind which has as yet been attempted, and will be an extremely useful work of reference. The leading contents of the volume are:

1. A numbered list of roads in alphabetical order, with their complete official staffs, running down as low as trainmasters, road-masters, foremen of shops, and all agents above station agents. The mileage is for the most part given, but not equipment statistics. The scope of the lists (which are very conveniently arranged) is shown by the fact that many of the lists for the large roads fill several pages of fine type.

2. A complete alphabetical list, with residence, of all the railroad directors in the United States, but without reference to the particular road or roads of which they are directors, which seems a somewhat singular omission, as it would have required merely the addition of a number to each name.

3. A new feature in the form of a list of some 1,200 or 1,500 railroad contractors, with the addendum that the list was for the most part furnished by railroad officers who had certified to the reliability of those names, and that reference to the official giving the name would be furnished on application.

4. A list of the rail mills of the United States, which seems to be rather more than complete, since many of the works listed make only iron rails, and some of them only very light rails. Had the publishers thought to append a note as to whether the rails made were good or poor they would have added to the value of this department, but we cannot have everything.

4. Similar lists of the car axle and car spring manufacturers, car-builders, car-wheel makers, locomotive builders and bridge-builders, in none of which we have detected omissions of any importance.

5. An alphabetical list of the railroads of Great Britain, with lists of their chief officers.

6. An alphabetical list by states and companies of the street car lines of the United States and Canada, with their mileage, equipment and chief officers.

7. A similar list of British tramways, which make a very respectable list.

8. A list of railroad commissioners of each state, with their salaries, term of office and other details.

9. An alphabetical list of all the railroad officials given in list No. 1, with reference to each road in the list (usually only one, but in some cases several) where their names occur. George B. Roberts, for example, occurs five times. A rough count indicates that there are some 8,200 names in this list. The fact that Mr. Albert Fink's name does not appear in it indicates that the lines were drawn a little too strictly, but this department seems to have been extremely well done.

10. A list of leased railroads, bridges and union stations, with the officers and lessees.

11. A list of officers and members of the New York Clearing House, and of the annual volume of exchange and date of organization of the 30 other clearing houses in the United States. As indicating the comparative volume of business, these statistics have a certain interest, although in great degree they are deceptive, since the enormous volume of speculative transactions in New York, to which the whole country contributes, places the annual clearings of New York far above those of London even. Calling the enormous aggregate (which, however, is less than two-thirds what it was in 1881) of $25,250,791,440 at New York 100, the other cities range: Boston, 13.3; Philadelphia, 8.9; Chicago, 8.9; St. Louis, 3.0; Baltimore, 2.34, and so on down through San Francisco, Pittsburgh, New Orleans, Cincinnati, Providence, Louisville, Milwaukee, Detroit, Cleveland and fifteen other towns to such trifling sums as twenty or thirty millions.

The usual supplementary list of additions and corrections then follows, and after it comes a very full list of all associations and societies in any way connected with railroad interests, extending to both the national and local engineering societies, boards of trade, etc. A list of express, fast freight and steamship lines (not giving the roads with which they connect or over which they run, as might be well), and a tolerably complete list of the Mexican and South American lines completes the volume.

A very extraordinary error, which we may well believe is the most serious in the volume, is the omission of all reference to the Mexican Railway, except to the little Jalapa Branch worked by mule power, 61¼ miles, between Vera Cruz and Jalapa, which little branch is given as a part of the Mexican Central Railway, with which it has no connection whatever.

Such varied contents ought certainly to make this a standard work of reference among those having to do with railroads. We have discovered a number of places in which changes which have occurred in the present year are not given, even in the supplementary list, and several misprints of names, but some imperfections of that kind are natural in a first attempt. The publishers announce that hereafter the volume will be issued in March and a quarterly statement of corrections issued to subscribers. "Many new and valuable features will be added in future editions," we are told also, and any deficiencies discovered corrected. As one of the chief of the latter we would recommend a change from the ugly and inconvenient end binding to the usual form such as is used in the Manual, of which it would then make a neat companion volume, since the page is of precisely the same size In the usual familiar form it would be much more readily and frequently consulted, and judging from the fact that only two or three per cent. of the advertisers print their advertisements to read across the long way of the page, the change would be as popular with advertisers as it would certainly be with those who use the book.

Foreign Technical Notes.

From a temperate review of the comparative working of the various continuous brakes in *Glaser's Annalen*, we extract the figures belows :

Continuous brakes have been applied to the following numbers of vehicles in Germany :

	Locomotives.	Cars with brake apparatus.	Cars with air pipes only.
Carpenter brake	658	1,626	
Steele	19	32	850
Westinghouse	32	66	
Schleifer	....	38	
Total air-pressure brakes	709	1,762	850
Sander's vacuum	14	36	43
Hardy "	160	379	73
Total vacuum	174	415	116
			With connection.
Friction brakes (Heberlein)	316	706	304
Weight pressure brakes	34	84	48
Grand total	1,233	2,967	1,378

—that is, nearly one-third of the passenger-train cars are provided with continuous brakes.

Very detailed statistics of the failures of the Steele, Carpenter and Westinghouse brakes are given, which are summed up for the two latter in the statement that a failure occurs on an average in each Carpenter brake once in 39 years, and in a Westinghouse once in four years. The author observes, however, that these figures do not indicate the exact comparative efficiency of the two brakes, because, first, they are taken over too short a time; and, secondly, the Westinghouse failures were partly owing to increased efficiency in braking, due to higher pressure carried.

The Carpenter, which is merely a simplification of the Westinghouse, has been adopted by the Prussian authorities, on the ground that its greater economy in first cost and maintenance more than compensates its slightly inferior braking efficiency. The author of the article says that he does not know of a single accident occurring with the Carpenter brake in which it could be shown that greater brake power would have prevented it.

The article is somewhat in the nature of a defense against complaints made of the slow introduction of continuous brakes upon the Prussian system, and it does not appear entirely successful in this light, when it is considered that only one-sixth, approximately, of the Prussian passenger trains are as yet fitted up with *air-pressure* brakes, notwithstanding the overwhelming testimony, both experimental and in practice, as to their superiority.

A commission appointed in Russia early in the year for the testing of rails and tires has recently reported, after testing 107 rails and 58 tires.

This material was chosen from a quantity offered by railroads, all of it having been in use, with a view to testing only material in regard to which the following information was available: For rails, the traffic load, cause of removal, position in the track, life, etc.; for tires, traffic load, and wear up to first turning, as well as up to time of disuse, with the cause of the latter.

The results of the tests, which seem to have been conducted with much thoroughness, on the basis of the discovery of the mechanical and chemical properties of good rails as compared with bad ones, were:

1. The best rails are harder than brittle rails. Hard rails are not necessarily brittle.

2. The best rails yielded less under the first blow of the drop weight, and had greater tensile strength, on an average 92,500 lbs. per square inch; their extension was less by about 19 per cent., and they had less diminution of section by 35 to 40 per cent.

3. The best rails contained more carbon and more manganese than brittle rails, and less manganese than excessively worn rails.

It was further observed that a certain relation (not stated) between the manganese and carbon in the rails tested appeared advantageous, and also a relation between the silicon and phosphorus.

The samples tested by the commission came from 40 different roads, and had undergone most diverse experiences, with lives from a few months to 10 years, and traffic varying from a few tons up to 20 million tons.

The rails were of Russian, English and French make.

The commission found very remarkable differences in the amount of silicon and phosphorus in the best as well as in the worst rails, and the proportion between these elements also varied greatly. In the best rails, however, the proportion between them did not vary much, and averaged 4 of silicon to 1 phosphorus, while in brittle rails these elements stood to each other as 3 to 2.

The commission was unable to get satisfactory information about the method of manufacture of rails tested, but is about to organize a second series of experiments on this point.

In regard to tires the commission found :

1. Tires from soft steel are more brittle (liable to break than hard steel ones.

2. Tires from soft steel wear much more rapidly than hard ones, and are not to be recommended.

3. Very hard steel is bad in use, and requires frequent turning up.

4. The best tires contained more carbon and much less manganese than less excellent ones, 0.5 per cent. against 0.37 per cent. for carbon, and 0.37 per cent. against 0.76 for manganese.

The proportion of silicon to phosphorus is pretty constant in the best tires.

The commission recommended changes in the imperial regulations for rail-testing, looking to the retention of the bending and drop-tests, the former only within the elastic limit, the latter to be tried both with chilled (reduced to freezing temperature) rails and w rm ones, with a reduction of the height of fall and omission of a second drop.

Each charge is to be tested for the above by taking one rail out and testing it in three pieces separately.

In addition, tensile and chemical tests are to be made periodically during delivery, for which limiting figures are set for strength and amount of injurious element, silicon, manganese and sulphur.

For tires the drop test is to be reduced and the tensile test retained.

Glaser's Annalen of Dec. 15, 1885, contains an exceedingly able and comprehensive review by Professor Reuleaux, of Berlin, of the various modes of power transmission for long distances, omitting, however, electricity.

He deduces the "specific values" for the different methods of transmitting power to a distance, which we give in the table below. These values represent in column 3 the horse-power that can be transmitted by a pound of material in the carrier and supporting bearings, wheels, etc., and in column 4 the percentage of the different "specific values" to that found for steel-rope circuit transmission. In regard to the different forms of transmission, it is to be observed that what he calls "circuit transmission" is that in which an endless rope serves a series of works arranged circumferentially, so that the cable is under working tension at all parts of its extent, except in the short stretch from the last factory to the origin of the power, over which it carries only the slack tension required to produce the necessary friction for giving off the power of the rope to the driven pulley. "Line transmission," on the contrary, is that in which the factory to which the last balance of power is given off is farthest distant, so that the slack rope has to be duplicated over the whole length of the line. The idea will become clearer if we imagine the series of factories served by "line transmission" bent around so that the last one is brought close up to the source of the power, thus cutting out an amount of slack cable equal to the difference of distance between the last factory and the source of power in the two cases:

Form of Transmission.	Velocity of carrier, ft. per second	Tension of carrier material, lbs. per square inch	Specific values	Percentages of spec. vals. to steel rope circuit transmission
Steel rope circuit transmission	98 4	21,300	17.48	100.
" " line "	98.4	21.300	8.71	50.
Iron " circuit "	98.4	10,650	8.71	50.
" " line "	98.4	10,650	4.36	25.
Belts "	98 4	540	2.72	15.6
Hemp rope line "	98.4	241	1 13	6.5
High pressure water with steel pipes	13.1	852	.93	5 3
High pressure water with iron pipes	13.1	426	.47	2.7
Steam pressure steel pipes	13.1	426	.47	2.7
" " cast-iron pipes	13.1	142	.15	0.9
Shafts, iron or steel	3.3*	426	.12	0.7

* Apparently surface velocity of shaft.

Prof. Reuleaux's increase of the specific value 100 per cent. for circuit transmission seems a little in excess, since that would presuppose entire elimination of a return cable, which must always exist to some extent.

In spite of the great proportional differences here shown, they might not be very important, inasmuch as they concern the only power transmission material, were it not that the friction and general resistances in operation, and also the wear and tear, are about in the same proportion.

In the case of a turbine, power transmission by cable at Ober Ursel, near Frankfort-on-the-Main, for a distance of 3,171 ft., Prof. Reuleaux shows that the specific value of transmitted power per pound of material would become with shaft transmission as 1 to 70 of the present transmission, or 70 lbs. weight, would be required to do what 1 pound in the present carrier accomplishes. As it is, out of 104 horse-power given out at the turbine, 14.56 horse-power are lost in transmission, while with shafting the loss would be 52 horse-power, and, instead of running all the year round, the 40.3 horse-power available at low water would not turn the shafting.

Professor Reuleaux proposes to apply rope driving not only to main transmissions, but to run all the machines of a large shop, for which he would use one continuous cable running the counter shafts directly, and in case of most machines, even driving the machines directly with only the intervention of a friction clutch to allow of ungearing. The cable would be kept tight by a counterpoise in the usual manner, and could be applied to every conceivable operation of the shop, the exceedingly high specific value of the form of transmission for over-balancing the great length of carrier to be kept in operation. He refers to the saving that must be effected in a great cotton factory, in one of which in the United States (presumably the Pacific mills at Lawrence, Mass.) there are about 4.8 miles of shafting.

The Wear of Iron and Steel Rails.

We have repeatedly called attention in these columns to the fact that for a rail-buyer to ask or accept a "five-years' guarantee" for the wear of steel rails is very much as if a man should ask his tailor to guarantee that his new suit of clothes would wear a week. In our issue of May 7, 1886, we said, more specifically: "The extent of this inferiority (of many modern rails) appears to be little appreciated by the average buyer, because few of them have any definite knowledge of the enduring service which really good steel rails, such as have been turned out in the past by the millions of tons, are capable of rendering. We therefore repeat that a rail which fails on a tangent under less than twenty years' service on any but perhaps 10,000 miles in the United States —certainly not more—is proved by that fact to be so poor a rail that no man who knew what he ought to get for his money would buy it at any price, and if any one ventures to question this, we cheerfully undertake to prove it in detail."

No one has ventured to question it, in which they have been wise, but the following very interesting testimony of Sir Isaac Lowthian Bell, well known as a competent authority in such matters, recently given before the Royal Commission on the Depression of Trade, goes far to prove it, and is worthy of careful attention by those interested in rails and track.

Sir Lowthian Bell first calls attention to the fact that, "notwithstanding the great superiority of steel in reference to the two qualities [of homogeneousness and strength] the experience of the Northeastern Railway would indicate that the actual wearing away of the substance of the rail is greater with steel that in the case of iron," which is no novelty. The fact has been observed before. The difference is small and probably not always one way, but in the main iron gives the best record, its inferiority lying in its ready lamination and unequal wear, so that the rail must be renewed long before it has lost any considerable amount of weight by abrasion. Sir Lowthian Bell then continues; the italics being our own:

"The system known under the name of the Northeastern Railway consists of 1,401 miles of road, exclusive of sidings, of which 954 miles are double and 447 miles are single roads. The rails used are of the double-headed pattern, weighing usually 82 lbs. per yard, set in chairs placed on wooden sleepers. For some time past, nothing but steel has been used for renewals, so that, by the end of 1884, 903 miles, chiefly the double way, were of this material, and 498 miles of iron. The traffic, taking the Northeastern line as a whole, is probably a fair average representative, in point of extent, of the railroads of the United Kingdom.

"Notwithstanding the short life of some of the iron rails, for the reasons already given, the average duration of the 903 miles of those that have been replaced with steel is 13.4 years, and the average life of those still in use is 12.1 years. From some cause or another, the large increase of traffic being probably the chief one, *the inspectors on the line consider ten years as the present life of an iron rail on those parts of the system where the traffic is most severe*, both in respect to weight and speed. On the other hand, *where the traffic is less heavy, even when the speed of the trains is frequently high*, as on the York & Scarborough branch, *iron rails are now in use that were laid down 22 years ago.*"

"*The length of the time during which steel has been laid down on the Northeastern system is not sufficiently long to enable its managers to speak, from actual removals over the whole length, as to its durability. Some, but only an exceedingly small proportion* as compared with iron, *fail at an early period*, not from lamination or crushing, but from fracture. *Such as have been removed from this and other causes have averaged 10 years of wear.* In the case of rails of malleable iron, renewals are necessary long before their loss of weight from abrasion renders them unsafe, by reason of their diminished weight and consequent want of the proper strength. This happens, as a rule, when the actual loss from this cause does not exceed 4 or 5 per cent. of the original weight; while in steel rails, abrasion proceeds until either the carriage-wheels touch the chairs, or the loss of weight is considered such as to render the rail too light for the work it has to perform. The following are cases of single rails that have been taken up and the loss of weight ascertained :

When laid.	Steel rails taken up at	Orig'l wt. per yd.	Years in use	Loss per yard	Loss per year	Analyses. Per cent. C.	Mn.	Si.	P.
		Lbs		Lbs.	Lbs				
1866.	Milford Junction	78½	12	8.50	0.71	.27	.33	.05	.06
1866	South-End Bramhope Tunnel	80½	12	20.125	1 68	.26	.26	.85	.11
1869.	Darlington	82	9	15.250	1.70	.24	.30	.05	.10
1870.	Scarboro	82	8	10.50	1.31	.31	.34	.19	.09
	Average	80¾	10¼	13.67	1.35	.27	.31	.16	.09
1875.	Bet. Croft and Darlington	80	3	1.0	0.33	.42	.81	.13	.07
1876.	Darlington	80	2	1.25	0.63	.38	.67	.08	.09
1877.	Staddiethorpe	80	1	1.12	1.12	.40	.72	.08	.09
	Average	80	2	1.12	0.69	.40	.73	.10	.083

We have added the lines of average to this table and

changed the sixth column, from per cent. of weight lost per year, which means little, to wear in pounds per year, which is a more useful unit. This we did to bring out clearly a salient fact in the table: the indication that as rails wear their rate of wear increases. Whereas rails two years old average a loss of only 0.69 lbs. per year, those 10¼ years old average 1.35 lbs. per year, or double that rate. There is, to be sure, a difference of chemical composition, but according to the burden of existing evidence the composition of the new rails should indicate that they are poorer rather than better rails. In evidence of this we subjoin the following analyses from an article on "The Chemical Composition of Some Bad Rails" in our issue of July 31, 1885, with those above added for comparison :

	Dudley's* specification for good rails.	Dudley's 44 *good* rails.	Dudley's 45 *poor* rails.	Mich. Cen. rails (very bad).
Carbon	.300	0.310	0.378	.385
Phosphorus	.100	0.077	0.119	.105
Silicon	.040	0.052	0.047	.040
Manganese	.350	0.430	0.584	.900
Total	.790	0.869	1.128	1.430
Phosphor. units	29.0	29.2	38.5	43.3

	—English rails given above.— Old (have worn fastest).	New (have worn slowest).	B. & O. rail (very fine)†
Carbon	0.270	0.400	0.360
Phosphorus	0.090	0.083	0.089
Silicon	0.160	0.100	0.124
Manganese	0.310	0.730	1.404
Total	0.830	1.313	1.957
Phosphor. units	32.2	41.2	53.2

These analyses tend rather to indicate that chemical composition is an entirely untrustworthy guide to quality—which is probably the fact—than to indicate that chemical composition has much to do with the striking difference of wear shown. The true cause of the difference—which is likewise visible in many other statistics—is more probably this: that as the rails become seriously worn, they expose more and more wearing area to the action of the wheel and flange, with consequent increase of wear. Unless the entire bearing surface be parallel with the axle, so that the distance which every point on the wheel in contact with the rail moves at one revolution is the same, this must necessarily result. There is, or ought to be, to be sure, a certain hardening or cold-rolling effect from the passage of the wheels which should, and no doubt does, more or less retard wear; but, on the other hand, we may well believe that the metal which is in the centre of the head, and farthest away from the compressive action of the rolls, is, even in the best rails, somewhat less calculated to resist wear than the exterior shell. At any rate, such appears to be the law, although it is naturally far less pronounced on curves than on tangents, and there are some contradictory records, as is also very natural. It is probable that many of the latter have originated in the fact that the earlier rails, which have worn most, were of better quality than those laid later, since the deterioration in the average quality of rails seems to have been general all over the world. Sir Lowthian continues:

"I am disposed, moreover, to think that, unless in very exceptional circumstances, abrasion of steel rails to the extent of 1 per cent. per annum is overstated, because in the case of 48 rails recently examined the yearly loss of weight from this cause averages only 0.60 per cent. At the same time it has to be observed that of these there are six cases (nearly 13 per cent. of the whole) in which the wear exceeded 1 per cent., the particulars of which are given below, and in respect to which it is considered that there was nothing either in the traffic passing over them or in the quality of the rails to account for the excessive amount of abrasion.

Annual abrasion. Per c'nt	Yrs in use	Situation on main line.	Contained per cent. Carbon.	Silicon.	Phosphorus.	Manganese.	Total
1.01	15	Fence House	.39	.10	.05	.35	0.89
1.05	17	Pelaw Main	.28	.02	.09	.23	0.62
1.07	9	Sherburn	.45	.07	.05	.67	1.24
1.15	12	Leamside	.47	.08	.06	.92	1.53
1.29	14	Heaton Station	.41	.06	.09	.45	1.11
1.51	10	Pensher	.36	.15	.07	.07	0.55
		Average	.393	.080	.068	.448	.989

Here also the same fact will be observed, that the rails which showed the highest relative wear were rails which had been laid many years.

The conclusion in respect to the life of rails is that the probable life is as 10 years for iron to 15 years for steel, with the limitation :

"Of iron, experience enables us to speak with certainty; but such is not the case with steel, and should this material be able to resist the wear under the heaviest traffic of the Northeastern Railway for 20 instead of 15 years, the wear would be correspondingly affected."

The traffic on this line averages, for the whole 1,534 miles, some 44 trains per day. The "heaviest traffic" on perhaps 400 or 500 miles is probably, at least, as high as 150 trains per day, or 75 trains over each track, a large proportion of them heavy mineral trains.

Finally, some very interesting notes are given as to impact tests, as follows :

"In testing the iron rails intended to be placed on the Northeastern line, each specimen selected for trial is placed on supports three feet apart, and a weight of 672 lbs. dropped upon it twice from a height of at least 5 ft. The fall is required to be increased to 16 ft. before the rails give way. For proving the steel rails, which are placed also on supports 3 ft. apart, the weight used is one of 1,800 lbs., allowed to fall twice from a height of 5 ft., and a third time from a height of 27 ft., which they bear without fracture.

"Some very interesting experiments have been tried recently by the inspectors of the permanent way of the Northeastern Railway on the 48 rails just referred to, which confirm the opinion that the continued vibrations of the passing trains have so altered the molecular structure of the steel as to have greatly impaired the strength of the metal. In the experiments, the rails were placed on supports 3 ft. apart, and a weight of 1,800 lbs. was dropped from different heights, usually commencing with 1 ft., and increasing the fall until fracture took place. The following figures show the particulars of the trials.

"Forty-eight steel rails tried as follows :

Number of rails tried	6	11	12	2	3	1	1	2	1	2	3	4
Fall in feet at which fracture took place	1	2	3	4	5	6	7	8	9	11	15	15

"The last four specimens under the fall of 15 ft. did not break.

"The average age of the rails when taken out was 12.04 years; the average loss per annum was 0.606 per cent.

"The deterioration of strength appeared so serious that two lots of rails, one of iron and one of steel, were submitted to trial under the weight of 672 lbs., of which, when the iron rails were new, two blows of 5 ft. and one of 16 ft. without fracture were considered satisfactory.

"Eighteen iron rails broke as follows :

Number	8	6	1	2	1
Fall in feet	2	3	4	5	10

"Average age, 11.5 years; average total waste, 4.16 per cent. = .36 per cent. per annum.

"Twenty-one steel rails broke :

Number of rails	3	7	6	2	1	1	1
Fall in feet	3	4	5	7	8	9	17

"Average age, 12.66 years; average total waste, 8.42 per cent. = 0.66 per cent. per annum.

"These two last experiments demonstrate that the iron rails have not lost so much of their original strength as those of steel; but on the other hand, at the end of the 12.66 years, the steel rails were still abundantly strong for their work."

In the same connection we may note the results of some very elaborate but rather inconclusive experiments on steel rails which have recently been made in Russia,* where there are now eight works, producing some 200,000 tons per year. The nature and purpose of these experiments is thus described :

"The severity of the Russian winter and the great variations of temperature determined the department having charge of this subject to order that it was desirable that in the manufacture of steel rails care should be taken to have them sufficiently mild. The following test prescribed, namely, 30 poods = ½ ton, from 7½ to 8½ ft. according to section, was fixed as the regular test for rails which were to be previously frozen in a mixture of ice and salt to a temperature of—5 deg. Fah. The softness of the rails was to be determined by testing under a press, a permanent set of one mm. being prescribed under a weight that rose or fell according to the section. Under these circumstances, the Russian steel-works undertook the production of rails of a milder description than the rails generally manufactured abroad. It was found that rails so produced from soft steel resisted the influence of a low temperature better than the rails manufactured from steel of a harder description, and the result has been that broken rails have not been nearly so frequent, even in the severest frost, as they were a few years ago, when the steel made use of was harder.

"Notwithstanding what seemed to be the obvious advantage of using softer steel for rails that were intended to resist great variations of temperature, it was discovered by the Russian Railroad Administration that a number of the rails produced from the soft ingot metal gave way after a very limited period of service. This defect was to some extent explained by having too short ends cut off the bar, leaving the extremities hollow, or by the use of too heavy locomotives, or by inadequate ballasting; and to meet these several difficulties, and others that came under their notice, the Russian railroad engineers considered whether it would not be advisable to somewhat increase the hardness of the rails used in the permanent way. With the view of furnishing data for the determination of the problem just stated, the Imperial Technical Society undertook to carry out a series of experiments on the wear of rails, relative to their hardness, on something like the lines that were adopted by Dr. Dudley in his well-known investigations on behalf of the Pennsylvania Railroad. For this purpose, the Russian Technical Society appointed a special commission of experts from their own body, which issued to all the Russian railroad administrations a circular letter requesting to be furnished with samples of rails not shorter than 10 feet in length, as well as tires of both Russian and foreign make, with a description of each specimen submitted.

"In response to their invitations, the Commission received 150 samples of rails of all kinds, and 113 samples of tires, from which they selected 107 rails and 44 tires, for the purpose of being tested. The experiments were conducted in the following way : 1. From each sample short pieces were cut off and turned for mechanical testing, made at the official laboratory of the Russian Institute of Civil Engineers; 2. From the same sample, turning chips were taken and analyzed under the superintendence of the Professor of Metallurgy at the School of Mines, at the official chemical laboratory; 3. The remaining length (not shorter than 7 inches) of each sample was tested at the Steel Works, St. Petersburg, under the inspection of Messrs. Beck-Guerhard and Anitchkoff, under the press and by the falling weight. The last test was performed on rails having at least —12 degrees R. (—5 degrees Fah.), the supports being on a solid cast-iron anvil of 20 tons. All possible measures were taken to avoid mistakes, and all the tests were made with the greatest care, so that there can be no doubt about the correctness of the results. Examining the tables, it is not easy to deduce from the figures positive rules or conclusions, as many of the facts obtained are quite contradictory. This fact shows that, apart from the chemical composition, there are many other partly unknown factors that have great influence on the character of steel rails. But still, a practical result appears to have been obtained, and a meeting of railroad engineers and rail-makers, called by his Excellency the Minister, after examining the labors of the Commision, resolved that the government rules and instructions then existing, determining the character of the steel, were to be so changed as to allow the rails to be made a little harder, and for this purpose a diminution of number and height of blows, and of the pressure under which the permanent set must be = 0, were proposed and submitted to the Minister of Ways and Communication."

Accompanying this paper is a very elaborate table, giving the physical and chemical tests of 107 good and bad rails As the paper well says, it is "not easy" to deduce anything positive from the records, especially as they are not even arranged and classified, but good and bad mixed in together heterogeneously. This is evident from the following figures, giving the average of two details only out of thirteen covered by the table, viz.: the deflection in millimeters (25 = 1 in.) produced by the fall of a half-ton weight :

	—Deflection after— First blow. mm.	Second blow. mm.
First lot of 8 sound rails	25	51
Second lot of 8 sound rails	36⅛	67⅛
Third " " " "	30	60
Average of all sound rails	30⅛	59⅛
First lot of 14 bad rails	29	59
Second lot of 7 bad rails	27	62
Third lot of 8 bad rails	32½	61
Fourth lot of 12 bad rails	30	56
Fifth lot of 9 bad rails	30⅛	60⅛
Average of all bad rails	29⅝	59.7

To determine this, we have reclassified the entire table into good and bad, and then subdivided each group arbitrarily into sub-classes, merely to determine how true the averages ran. It is obvious that the deflection test in this case shows absolutely nothing. The "bad" rails had mostly broken in the track.

TECHNICAL.

Locomotive Building.

The Dickson Manufacturing Co. in Scranton, Pa., is building 2 passenger engines with 19 by 24-in. cylinders, for the Delaware & Hudson Canal Co. These engines have steel boilers, and the Boies steel-plate wheels under the trucks. The company has also nearly ready for delivery the third locomotive for the New York & Brooklyn Bridge.

At the annual election of the Dickson Manufacturing Co. recently Mr. James P. Dickson, formerly Vice-President and General Manager, was chosen President, in place of Col. H. M. Boies resigned.

The Pittsburgh Locomotive Works in Pittsburgh have received an order for a passenger engine for the Los Angeles & San Gabriel Valley road.

The Lehigh Valley shops at Hazleton, Pa., have completed a heavy passenger engine with 24-in. cylinders and 68-in. drivers. The boiler is 58 in. diameter of barrel. This engine is intended to work heavy passenger trains over the mountain division.

The Car Shops.

The order for the 20 passenger cars recently given out by the Union Pacific Co. is divided between the Pullman shops at Pullman, Ill., and the Barney & Smith Manufacturing Co. in Dayton, O.

The Martin Anti-Fire Car-Heater Co. in Dunkirk, N.Y., has received an order to fit up a passenger train on the Boston & Albany road with its steam heating apparatus. The train will run between Boston and Springfield.

The Sheffield Velocipede Car Co. in Three Rivers, Mich., has begun the manufacture of the Hagan steel-tired wheel. This wheel has a cast-iron hub, steel tire and a double steel plate.

The Pullman car shops in Pullman, Ill., are building 15 passenger cars for the Minnesota & Northwestern road.

The Missouri Car & Foundry Co. in St. Louis is running its shops full time in all departments and has orders enough on hand to keep busy for three months to come.

Car Couplers.

Fifty new Tiffany refrigerator cars are being fitted with McKeen's improved automatic car coupler at the Lehigh Valley shops at Packerton. This coupler has also been thoroughly tried on some six-ton coal cars with a short drawhead, being placed in the centre of a train of 100 cars. It is stated to work satisfactorily, and costs about $5 per car less than the hook and three-link coupler now used. It can, of course, be used also on ore cars or any other short cars.

In Boston, June 11, the Massachusetts Railroad Commissioners gave a hearing to inventors and others interested in car couplings, for the purpose of considering the merit of any couplers not now authorized to be used by the railroads within the state.

Mr. W. W. Kimball presented the Boston automatic coupler and exhibited a sample, as well as a working model. Verbal opinions from several railroad men were heard and a number of letters and testimonials were filed. The Commissioners reserved their decision.

Bridge Notes.

The Phenix Bridge Co., at Phenixville, Pa., is building two new iron bridges on the Little Miami road to replace wooden bridges.

W. C. Coolidge & Co., in Chicago, has taken a contract for a new bridge over the Miami River for the Little Miami Railroad. It will replace a wooden bridge built some 20 years ago, and will have two deck spans built for double track.

Iron and Steel.

The Baird Furnace in the Hanging Rock region in Ohio went into blast June 15.

The Union Steel Co. in Chicago started up its steel works June 4 and the rail mill on June 11 and is now running its works full time.

The Middlesex Rolling Mill in Sharon, Pa., has been sold to parties from New York and Pittsburgh, who will convert the works into a plant for the manufacture of steel by the Graphite patent. The new owners will take possesson of the mill July 1.

The Brier Hill Iron & Coal Co. in Youngstown, O., is making extensive improvements at the Tod furnace and is also putting in a new blowing engine at the Grace furnace.

The Junction Iron Co. started up its rolling mill at Martin's Ferry, O., last week.

Manufacturing and Business.

The Sheffield Velocipede Car Co. in Three Rivers, Mich., has a contract to furnish Dodge stand-pipes for all the water stations on the new Chicago, Burlington & Northern road.

The Vulcan Iron Works in Chicago are building a pile-driver car for the Atchison, Topeka & Santa Fe road.

At the annual meeting of the McLeod Railroad Air Signal

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* Dr. Chas. B. Dudley, chemist of the Pennsylvania Railroad, made two very elaborate investigations into the chemical and physical qualities of steel rails for the Pennsylvania Railroad (published in the *Railroad Gazette* of Jan. 17, 1879, and Jan. 24, 1881), in which he proposed and used a method of comparing the hardness of rails in which 0.01 per cent. of phosphorus was taken as a "phosphorus unit," and it was assumed that 0.02 per cent. of silicon, 0.03 per cent. of carbon and 0.05 per cent. of manganese were each equal in hardening effect to 0.01 per cent. of phosphorus; all these elements being classed together as "hardeners" of steel. Within the limits of his investigation Dr. Dudley found that these assumptions seemed to give results harmonizing with the facts. His final conclusions were:

"It would therefore almost seem fair to conclude that *we cannot with safety have the total sum of the carbon, phosphorus, silicon and manganese in our rails as high as one per cent.*," and—

"It almost seems fair to conclude, therefore, that, measured in phosphorus units in the manner described, *we cannot have rails whose total sum of hardeners in phosphorus units is over* 31 *or* 32."

† In the discussion on Dr. Dudley's paper, Mr. W. R. Jones, of the Edgar Thomson Steel Works, presented this analysis of a John Brown steel rail which had given remarkably good service for 11½ years on the Baltimore & Ohio road under 55,000,000 tons duty, as controverting the justice of Dr. Dudley's conclusions.

* "Experiments made with Steel Rails in Russia," by M. Beck-Guerhard, St. Petersburg; a paper read before the British Iron and Steel Institute, May 14, 1886.

Co. in Hartford, Conn., last week, Col. Thomas R. Sharp, of New York; Judge H. B. Freeman, of Hartford; George W. Grant, of Ottawa, Can.; J. S. McLeod and William S. Crosby, of Boston; E. Pickhardt, of Somerville, and Samuel B. Hamlin, of New Bedford, were elected directors for the ensuing year.

The Rail Market.

Steel Rails.—Quite a number of sales are reported, and there are several large orders on the market. Quotations are $34.50@$35 per ton at mill for early deliveries, and $34@$34.50 for late fall and winter orders. While the rail mills are fully occupied, there appears to be no disposition to raise the prices at present.

Rail Fastenings.—A fair business is reported, with quotations unchanged at 2.40 cents per lb. for spikes in Pittsburgh; 2.70@3.10 for track-bolts and 1.65@1.80 for splice-bars.

Old Rails.—Old iron rails are not in much demand, but the market is steady, with quotations at $18.50@$19.50 per ton at tide water. Old steel rails are quoted at $20@$22 per ton in Pittsburgh, with short supply.

British Rail Exports.

Exports to the United States and to all countries for the month of May and the five months ending with May are reported as follows by the Board of Trade, in tons of 2,240 lbs.:

	May.			Five months.		
To United States:	1884.	1885.	1886.	1884.	1885.	1886.
Iron rails	.....	.....	.....	.....	.....	11
Steel rails	50	1,842	1,453	8,697	4,843	10,114
To all countries:						
Iron rails	1,062	720	437	5,211	5,884	4,724
Steel rails	65,653	53,805	48,909	237,008	203,301	160,202
Total	66,715	54,525	49,346	242,219	209,185	164,926

One-third of all the exports this year were to the East Indies, more than one-fifth to Australia, and about 8 per cent. each to Canada and Brazil.

Engineers' Society of Western Pennsylvania.

At a meeting of this Society in Pittsburgh, June 15, Mr. Alex. Dempster offered a series of resolutions expressing full confidence in Capt. J. B. Eads and indorsing his ship railway project. The resolutions request Congressmen Negley and Bayne and Senator Cameron to aid Captain Eads before Congress. Mr. Dempster made a long speech in support and explained the provisions of the bill before Congress. The matter met with considerable objection, some of the members not caring to commit the Society to it, though they favored it individually. As the attendance was not large, Mr. Dempster moved that consideration of the resolution be postponed until the next meeting. It was adopted, and the members listened to a paper by Colonel T. P. Roberts on the Pressure of Gas in Long-Distance Transportation. The Society then adjourned until the third Tuesday in September.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Nashville, Chattanooga & St. Louis, annual meeting, in Nashville, Tenn., Sept. 15. Transfer books closed June 16.

Oregon Railway & Navigation Co., adjourned annual meeting, in Portland, Oregon, June 28.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Chicago, Rock Island & Pacific, 1¾ per cent., quarterly, payable Aug. 2, to stockholders of record on June 26.

Chicago, St. Paul, Minneapolis & Omaha, 3 per cent., semi-annual, on the preferred stock, payable July 20, to stockholders of record on June 30.

Flint & Pere Marquette, 2½ per cent., semi-annual, on the preferred stock, payable July 17, to stockholders of record on June 26.

Herkimer, Newport & Poland, 1½ per cent., semi-annual, payable July 1.

St. Paul & Duluth, 3½ per cent., semi-annual, on the preferred stock, payable July 1.

Shore Line (leased to New York, New Haven & Hartford), 4 per cent., semi-annual, payable July 8.

Vermont Valley, 3 per cent., semi-annual, payable July 1.

Worcester, Nashua & Rochester (leased to Boston & Maine), 3 per cent., semi-annual, payable July 1.

Railroad and Technical Conventions.

Meeting and conventions of railroad associations and technical societies will be held as follows:

The *American Society of Civil Engineers* will hold its annual convention in Denver, Col., beginning on Friday, July 2.

The *Central Traffic Association, Passenger Department*, will hold a special meeting at Cresson Springs, Pa., on Monday, June 28.

The *Southern Railway & Steamship Association* will hold its annual convention at the National Hotel in Washington, on Wednesday, July 14.

Southern Railway & Steamship Association.

Notice is given that the twelfth annual convention of the Southern Railway & Steamship Association will be held at the National Hotel, Washington, D. C., on Wednesday, July 14 next.

Transportation companies, members of or working with the Association, are invited to send duly authorized representatives.

The convention will be called to order at noon.

Chicago, Burlington & Quincy Employes' Protective Association.

The annual meeting of this Association was held in Burlington, Ia., last week. The Secretary's and Treasurer's reports showed about $8,000 paid out last year to the families of deceased members. It was decided to make an increased effort to enlarge the usefulness of the association the coming year. The meeting adjourned to meet in Burlington the second Tuesday in June, 1887. The association is a purely voluntary benevolent association gotten up for the benefit of the employés, and during the last 13 years has paid over $110,000 to the families of employés. Nearly all the officers of the company are members.

Chicago Superintendents.

A dispatch from Chicago, June 23, says: "The superintendents of the various railroads centring in Chicago met yesterday at the Burlington offices and decided that each official should furnish data, to be mutually used, covering the number of employés, rates of wages paid in all of the departments, rules by which the labor is governed, and such other information as may be used by the superintendents. The object is to secure uniformity of action in meeting any trouble that may arise, and in dealing with strikes, demands of labor associations, etc. The organization will be perfected at a future meeting."

ELECTIONS AND APPOINTMENTS.

Americus, Preston & Lumpkin.—At the annual meeting in Americus, Ga., last week, the following directors were chosen: C. A. Huntington, H. R. Johnson, T. Wheatley, G. W. Glover, S. H. Hawkins, J. R. Stapleton, J. B. Hudson, J. W. May, T. S. Chappell, W. S. Gillis, J. B. Latimer, J. M. Scott, W. H. Tatum.

Atchison & Western.—The directors of this new company are: C. W. Benning, A. J. Harvey, George W. Glick, John M. Price, John C. Tomlinson. Office in Atchison, Kansas.

Bodie & Benton.—Mr. H. M. Yerington is President of this California company, and Mr. Thomas Hold is Superintendent. Mr. E. L. Reese has recently been appointed Master Mechanic. General offices, Bodie, California.

Brenham & Brazos Valley.—Mr. Murray Harris has been appointed Chief Engineer of this new company. Address, Brenham, Texas.

Car Accountants' Association.—At the convention in Buffalo last week the following officers were elected: President, A. P. Wilder, Atchison, Topeka & Santa Fe; Vice-President, R. F. Hoyle, East Tennessee, Virginia & Georgia; Secretary, H. H. Lyon, Chicago & Alton; Treasurer, E. M. Horton, Illinois Central.

Chicago & Atlantic.—Mr. J. H. Tinney having resigned as Assistant Superintendent, it is announced that that office is abolished, and that Superintendent J. H. Parsons will have entire charge, removing his office from Chicago to Huntington, Indiana.

Chicago, Burlington & Quincy Employés' Protective Association.—At the annual meeting in Burlington, Ia., June 15, the following officers were chosen: President, L. O. Goddard, Chicago; Vice president, J. D. Besler, Galesburg, Ill.; Secretary, John Lass, Galesburg, Ill.; Treasurer, F. C. Smith, Chicago. Directors: T. J. Potter, Chicago; L. J. Allen, Aurora, Ill.; Robert W. Colville, Galesburg, Ill.; S. B. Harrington, Burlington, Ia.; C. T. Leonard, Creston, Iowa.

Chicago, Kansas & Nebraska.—The officers are: M. A. Low, President; H. A. Parker, Vice-President and Chief Engineer; C. F. Jilson, Secretary and Treasurer. The company is controlled by the Chicago, Rock Island & Pacific.

Cincinnati, Hamilton & Dayton, Leased Lines.—Officers have been elected as follows: *Cincinnati, Hamilton & Indianapolis.*—President, Christian Meyer; Vice-President, C. C. Waite; Secretary and Treasury, F. H. Short. *Cincinnati, Richmond & Chicago.*—President, Eugene Zimmerman; Vice-President, C. C. Waite; Secretary and Treasurer, F. H. Short.

Columbia, Newberry & Laurens.—The officers of this company are: President, M. Moseley, Prosperity, S. C.; Secretary and Treasurer, J. C. Iredell, Columbia, S. C.; General Manager, James O. Meredith, Newberry, South Carolina.

Dayton & Chicago.—The following are the directors of this new company, formed by the consolidation of the Dayton & Northern and the Decatur & Ohio River: James O. Arnold, Dayton, O.; John R. Shuman, Covington, O.; David M. Coate, West Milton, O., David Shaw, Union, O.; William Patty, Pleasant Hill, O.; Otto Gresham, Indianapolis, Ind.; Wm. M. Gleiss, New York; Thomas H. Wheeler, Orange, N. J.; Thomas J. Filney, Brooklyn.

Dayton & Michigan.—This company (whose road is leased to the Cincinnati, Hamilton & Dayton) has elected Henry S. Ives President; C. C. Waite, Vice-President; F. H. Short, Secretary and Treasurer.

Des Moines & Fort Dodge.—At the annual meeting, June 17, the following directors were elected for three years: Joseph E. Brown, A. R. Flower, Reuben S. Middleton.

Detroit, Mackinac & Marquette.—At the annual meeting, June 14, the following directors were chosen: F. E. Driggs, George Hendrie, James McMillan, Hugh McMillan, W. B. Moran, John S. Newberry, Francis Palms, Detroit, Mich.; George I. Seney, New York.

Dubuque, Mt. Auburn & Southwestern.—Mr. M. McIntier is Superintendent of Construction, with office at Mt. Auburn, Iowa.

Fargo Southern.—This company, a proprietary line of the Chicago, Milwaukee & St. Paul, has elected officers as follows: President, Alexander Mitchell; Vice-President, Roswell Miller; Secretary and Treasurer, P. M. Myers.

Gulf, Colorado & Santa Fe.—In Galveston, Tex., June 16, four members of the board of directors, J. H. Hutchings, J. E. Wallis, Leon Blum and H. Kempner, tendered their resignations, and the following gentlemen were elected in their places: William B. Strong, Isaac T. Burr and A. W. Nickerson, of Boston; Webster Snyder, of Galveston. The other members of the board are President George Sealy, R. S. Willis and Waters Davis. This reorganization gives the Atchison Co. a majority in the new board. Mr. Webster Snyder will continue General Manager of the road.

Grafton & Greenbrier.—At the annual meeting in Beverly, W. Va., June 16th, M. G. W. Whitescarver was re-elected president, with old board of directors.

Hamilton & Northwestern.—At the adjourned annual meeting in Hamilton, Ont., May 25, the following directors were elected: John Stuart, John Proctor, Wm. Hendrie, B. E. Charlton, Hon. Jas. Turner, M. Legatt, J. W. Barclay, M.P., Ald. Sir Thos. Dakin and Charles Bischoff. At a subsequent meeting John Stuart was re-elected President, and J. Proctor, Vice-President.

Herkimer, Newport & Poland.—At the annual meeting in Newport, N. Y., June 22, the old directors were re-elected, and subsequently elected E. M. Burns, President; T. E. Merritt, Secretary and Treasurer; Albert Wilbur, General Superintendent.

Irondale, Bancroft & Ottawa.—At a meeting of the shareholders in Toronto, Ont., May 26, the following directors were elected: Henry S. Howard, S. C. Wood, Toronto; W. A. F. Wood, Madoc, Ont.; W. A. Humphreys, New York; C. J. Pusey, Irondale, Ont. Mr. Henry S. Howland was subsequently elected President.

Joliet, Aurora & Northern.—Mr. W. C. Cowgill is appointed General Freight and Passenger Agent of this company, with headquarters at Chicago. Appointment to take effect June 17.

Kansas, Nebraska & Dakota.—General Manager L. L. Bush announces appointments on this new road as follows: Superintendent of Transportation, H. M. Fickinger, Fort Scott, Kan. Agents, E. F. Holt, Fort Scott; J. P. Hainen, Devon; M. Hall, Mapleton; E. Fowler, Blue Mound.

Long Island Elevated.—This company was organized at a meeting held in Brooklyn, N. Y., June 21, with the following directors: Samuel W. Bowne, Austin Corbin, N. H. Frost, Henry Graves, John G. Jenkins, W. B. Kendall, H. W. Maxwell, J. R. Maxwell, Wm. Richardson, Frederick A. Schroeder. The board elected Austin Corbin President; Wm. Richardson, Vice-President; W. H. Maxwell, Secretary; N. H. Frost, Treasurer.

Master Mechanics' Association.—At the convention in Boston last week the following officers were chosen for the ensuing year: President, Wm. Woodcock, Elizabethport, N. J.; First Vice-President, Jacob Johann, Huntington, Ind.; Second Vice-President, R. H. Briggs, Elizabethtown, Ky.; Secretary, J. H. Setchel, Dunkirk, N. Y.; Treasurer, George Richards, Boston.

Michigan & Ohio.—Receiver George L. Bradbury has appointed Mr. O. W. Bell Superintendent. Mr. Bell was recently on the Peoria, Decatur & Evansville road.

Mobile & Ohio.—The following order from Vice-President and General Manager T. M. R. Talcott is dated Mobile, Ala., June 18:

"1. On and after July 1, 1886, the Mobile & Ohio Railroad, in connection with the St. Louis & Cairo Railroad, will be operated in two divisions.

"2. The first division, which will be known as the Mobile Division, will extend from Mobile, Ala., to Corinth, Miss., and will be under the immediate superintendence of Mr. J. W. Fry, with headquarters, as at present, at Mobile.

"3. The second division, which will be known as the St. Louis Division, will extend from Corinth, Miss., to East St. Louis, Ill., and will be under the immediate superintendence of Mr. Charles Hamilton, whose headquarters will remain at St. Louis, Mo.

"4. On and after July 1, also, the Auditor's and Cashier's departments at St. Louis will be abolished, and all accountings will thereafter be made to and with the Comptroller (Geo. Layet) of the Mobile & Ohio Railroad Co., at its main office at Mobile, Ala., and all remittances will be made to the Treasurer (Hy. Tacon) of the Mobile & Ohio Railroad Co., at Mobile, Ala., or as may be directed by him.

"5. The office of the Assistant General Freight Agent (S. Hopkins) will remain as heretofore at St. Louis, Mo.

"6. Mr. J. G. Motley, Chief Engineer, will continue in charge of the work of reconstruction of that part of the St. Louis Division between Cairo and East St. Louis, and all accountings in connection therewith will continue to be made to and with W. W. Booraem (late Auditor of the St. Louis & Cairo Co.) at the office of the Mobile & Ohio Railroad Co., at St. Louis."

Mobile Railroad & Harbor Co.—The officers of this new company are: President, W. H. Ketchum; Vice-President, H. Austell; Secretary, John Mahon. Office in Mobile, Alabama.

Newport News & Mississippi Valley Co.—Mr. H. W. Fuller is appointed General Passenger Agent. He holds the same positions on the Chesapeake & Ohio road.

New York, Lake Erie & Western.—It is reported that Mr. W. M. Clements is to be General Manager of the new Erie Express. He was formerly on the Baltimore & Ohio, and for some time past has been General Superintendent of the New York, Pennsylvania & Ohio.

Ogdensburg & Lake Champlain.—At the annual meeting, June 16, the following directors were chosen: W. J. Averill, Ogdensburg, N. Y.; D. W. Lawrence, Malone, N. Y.; Timothy Hoyle, Champlain, N. Y.; J. W. Hobart, E. C. Smith, J. Gregory Smith, F. S. Stranahan, St. Albans, Vt.; B. B. Smalley, Burlington, Vt.; J. R. Langdon, Montpelier, Vt.; S. A. Carleton, Wm. A. Haskell, H. L. Millis, Sterne Morse, Boston.

Ohio & Mississippi.—The following order from Superintendent C. C. F. Bent is dated Cincinnati, June 15: "On June 20 Mr. C. B. Cole will resume his duties as Master of Transportation of the main line and Louisville Branch. On and after that date the office of Assistant Trainmaster will be abolished, and trainmen will report to the Trainmaster. Employés will be governed accordingly."

Oregon Improvement Co.—At the annual meeting in Portland, Or., June 21, the following directors were chosen: Elijah Smith, J. J. Higginson, A. S. Rosenbaum, J. N. Dennison, C. J. Smith, J. M. Fox, C. H. Prescott, Joseph Simon and D. P. Thomson.

Oregon & Transcontinental Co.—At the annual meeting in Portland, Or., June 21, the following directors were chosen: C. A. Dolph, Henry Failing, W. S. Ladd, C. H. Loomis, C. H. Prescott, Joseph Simon, C. J. Smith, Portland; John N. Hutchinson, Philadelphia; Oliver Ames, Jonathan Bourne, Jr., Charles L. Colby, J. J. Higginson, Elijah Smith, Boston; Wm. L. Ball, Sidney Dillon, Christopher Meyer, John Muir, New York. The new directors are Messrs. Ames, Bourne, Ball, Dillon and Hutchinson, who succeed Wm. Endicott, Jr., A. B. Guion, N. P. Hallowell, W. M. Ladd and C. H. Taylor. The Union Pacific, it will be seen, now has two representatives in the board.

Rochester & Genesee Valley.—Director and officers have been elected for ensuing year as follows: Directors: D. W. Powers, James Brackett, J. C. Gray, G. H. Perkins, Frank S. Upton, Wm. N. Cogswell, J. B. Perkins, Henry C. Brewster, B. D. McAlpine, John Lutes, J. H. Foley, J. E. Butterfield, C. F. Pond. Officers: President, James Brackett; Vice-President, D. W. Powers; Secretary and Treasurer, J. B. Perkins. Finance Committee: Frank S. Upton, Henry C. Brewster, Wm. N. Cogswell. Executive Committee: G. H. Perkins, John Lutes, B. D. McAlpine.

St. Augustine & Palatka.—The officers are: President, Richard McLaughlin; Superintendent, W. J. Jarvis; General Freight and Passenger Agent, A. F. Sherwood; office at Palatka, Florida.

St. Paul & Duluth.—At the annual meeting in St. Paul, Minn., June 21, the following directors were chosen: W. H. Fisher, John J. Hill, James Smith, Jr., H. H. Upham, St. Paul; C. D. Drake, Washington; J. M. Earle, W. H. Rhawn, Philadelphia; O. D. Baldwin, New York; Charles Fairchild, Boston. Messrs. Baldwin and Fairchild are new directors, replacing Roswell Miller and E. W. Winter. The board elected W. H. Fisher President; W. H. Rhawn, Vice-President; Philip S. Harris, Secretary and Treasurer; James Smith, Jr., General Solicitor; W. H. Rhawn, John J. Hill, H. H. Upham, J. M. Earle and W. H. Fisher, Executive Committee.

Shore Line.—At the annual meeting of this company (whose road is leased to the New York, New Haven & Hartford Co.) in New Haven, Conn., June 21, the old board was re-elected, and subsequently re-elected S. B. Chittenden President; E. H. Trowbridge, Vice-President; Wilbur F. Day, Secretary and Treasurer.

Sioux City & Des Moines.—The officers of this company are: President, John Peirce; Vice-President, T. P. Gere; Secretary, F. C. Hills; Treasurer, Crawford Livingston. Office in Sioux City, Iowa.

Southern Pacific Co.—The announcement recently made that Mr. E. G. Thompson had resigned his position as Superintendent of the lines of the Atlantic system west of LaFayette, La., was, we are informed, not correct. The statement was made on authority presumably good, and the reason for starting a false report is not at all apparent.

Toledo, St. Louis & Kansas City.—The directors of this company, successor to the Toledo, Cincinnati & St. Louis, have elected J. M. Quigley President; George L. Bradbury, Vice-President; J. W. White, Secretary and Treasurer.

PERSONAL.

—Mr. James H. Tinney has resigned his position as Assistant Superintendent of the Chicago & Atlantic road.

—Mr. A. Van Tuyl, Master Mechanic of the Cairo, Vincennes & Chicago road, died in Indianapolis, June 10, after a protracted illness.

—Mr. S. M. Rowe has resigned his position as Resident Engineer of the New Mexico Division of the Atchison, Topeka & Santa Fe road. He has been on the road six years.

—At the annual election of the Dickson Manufacturing Co. in the early part of this month Col. H. M. Boies resigned the presidency, and was succeeded by Mr. James P. Dickson, formerly Vice-President and General Manager.

TRAFFIC AND EARNINGS.

Coal.

Coal tonnages for the week ending June 12 are reported as follows:

	1886.	1885.	Inc. or Dec.	P.c.
Anthracite	694,386	658,826	I. 35,560	5.4
Eastern bituminous	225,808	208,003	I. 17,805	8.6
Coke	75,432	44,140	I. 31,292	71.1

The anthracite trade is reported dull and prices low, but with some prospect of improvement. The allotment for July has been fixed by the companies at 2,500,000 tons.

The coal tonnage of the Pennsylvania Railroad for the week ending June 12 was:

	Coal.	Coke.	Total.	1885.
Line of road	147,566	74,355	221,921	182,242
From other lines	77,739	1,077	78,816	70,834
Total	225,305	75,432	300,737	253,076
Year to June 12	4,963,300	1,404,701	6,368 001	5,924,520

Increase for the week, 37,661 tons, or 14.9 per cent.; increase for the year, 443,481 tons, or 7.5 per cent.

Cumberland coal shipments for the week ending June 12 were 68,376 tons. Total to June 12 this year, 596,548; last year, 1,166,746; decrease, 570,198 tons, or 48.9 per cent.

Pennsylvania Railroad coal tonnage for the week ending June 19 was:

	Coal.	Coke.	Total.	1885.
Line of road	159,720	70,787	230,507	192,488
From other lines	81,925	875	82,800	65,517
Total	241,645	71,662	313,307	258,005
Year to June 19	5,205,000	1,476,363	6,681,363	6,182,525

Increase for the week, 55,302 tons, or 21.4 per cent.; increase for the year, 498,838 tons, or 8.1 per cent.

Cumberland coal shipments for the week ending June 19 were 65,789 tons. Total to June 19, this year, 662,337; last year, 1,215,767; decrease, 553,430 tons, or 45.5 per cent.

Indianapolis Car Movement.

The number of cars received and forwarded at Indianapolis has been:

	Week ending— May 22.	May 29.	June 5.	June 12.	June 19.
1886—Total	18,796	18,950	18,588	18,587	18,672
Loaded	14,436	14,321	13,866	13,735	13 617
1885—Total	16,975	18,271	18,750	.....	17,962
Loaded	12,848	13,845	14 321	.....	13,436

The movement was about the same as in the previous week, with a slight gain over the corresponding week last year. West-bound movement keeps up well; a decrease in east-bound movement is reported, but a gain in local business, which is reported as larger than for several years past in June.

Anthracite Coal Tonnage.

Anthracite coal tonnages for May and the five months to May 31 are reported as below by Mr. John H. Jones, the Official Accountant, the statement including the entire production of anthracite coal, excepting that consumed by employés and for steam and heating purposes about the mines:

	—May.— 1886.	1885.	—Five months.— 1886.	1885.
Philadelphia & Reading	895,835	941,285	4,061,790	3,792,346
Lehigh Valley	459,853	464,583	2,347,758	1,884,638
Del., Lack. & West	332,117	325 784	2,049,392	1,535,305
Del. & Hud. Canal Co	216,469	263,761	1,416,220	1,055,551
Pennsylvania Railroad	225,273	287,809	1,301,647	1,267,654
Pennsylvania Coal Co	96,780	103,775	466 991	492,034
N. Y., L. E. & W.	27,322	52,766	287,259	213,762
Total	2,253639	2,439,766	11,931,057	10,211,290

Decrease for the month, 186,127 tons, or 7.6 per cent., all the companies showing diminished tonnage except the Lackawanna. Increase for the five months, 1,719,767 tons, or 16.8 per cent., all the companies showing gains.

The division of tonnage for the five months, was as follows, comparisons being made with last year:

	—1885.— Actual.	Allotted.	—1884.— Actual.	Allotted.
Philadelphia & Reading	34 04	37.61	37.10	38.85
Lehigh Valley	19.68	18.96	18.50	19 60
Del., Lack. & Western	17.17	15.54	15 00	16.05
Del. & Hudson Canal Co	11.87	10.66	10.40	11.00
Pennsylvania Railroad	10.91	10.45	12.40	8.00
Pennsylvania Coal Co.	3.92	4.84	4.50	5.00
N. Y., Lake Erie & Western	2 41	1.94	2.10	1.50
Total	100.00	100.00	100.00	100.00

The stock of coal on hand at tidewater shipping points, May 31, 1886, was 614,451 tons; on April 30, 1886, it was 704,169 tons; decrease, 89,718 tons, or 12.3 per cent., during the month.

Central Iowa Traffic Association.

Earnings on business in the Central Iowa Traffic Association for May were as follows:

	—West-bound.— Tons	Revenue.	P.c.	—East-bound.— Tons.	Revenue.	P c
C., R. I. & P	1,716	$11,337	35	175	$1,189	33
C. & N. W	1,120	6,898	21	56	359	10
C., B. & Q	1,156	5,746	17	194	912	26
C., M & St. P	598	4,246	13	188	743	21
W., St. L. & P	731	4,522	14	44	358	10
Totals	5,321	$32,749	100	655	$3,561	100

The Northwestern and the Burlington had over their proportions on west-bound business; the Burlington and the St. Paul were over on east-bound business. Both west and east-bound business show a decrease from last year.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

	1886.	1885.	Inc. or Dec.	P. c.
Five months to May 31:				
Ala. Gt. South	$456,520	$451,599	I. $5,930	1.3
Char., Col. & A	330,786	336,279	D. 5,493	1 6
Cin., N. O. & T. P.	1,053,142	1,001,273	I. 51,869	5.1
Col. & Greenville	282,024	286 778	D. 4,754	1.6
Cleve. & Canton	127,760	116,826	I. 10,934	9 3
Net earnings	33,321	18,042	I. 15,279	84.9
K. C., Ft S. & G.	975,010	1,062,745	D. 87,715	8.2
K. C., Spr. & M	567,370	723,671	D. 56.301	6.9
N. Orl. & N. E	260,459	308,480	D. 48,021	15.6
Pennsylvania	18,914,067	17,583,959	I 1,330,108	7.5
Net earnings	6 318,295	5,610,219	I. 708,076	12.4
South Carolina	458,592	482,469	D. 23,877	4.9
Vicks. & Mer	205,729	172,852	I. 32,877	19 0
Vick., Shre. & P.	170,394	134,648	I. 35,746	26.5
Va. Midland	556,400	570,022	D. 13,622	2.4
Western N. C	195,771	178,563	I. 17,208	9.6
Four months to April 30:				
Bur., C. R. & No.	$836,154	$944,082	D. $107.928	11 4
Net earnings	205.435	256.510	D. 51.075	19 1
Cl., C., C. & I	1,145,847	1,078,984	I. 71,863	6.7
Den. & R. G	1,814,486	1,741 770	I. 72,716	4 2
Net earnings	571.815	486.591	I. 85,224	17 5
Des M. & Ft. D	104,270	114,168	D. 9,898	8.7
Net earnings	21,949	25.156	D. 3,207	12 8
L. R., M. R. & T	111,512	108,299	I. 3,213	2.9
N. Y. C. & H. R	8,485.000	7,778,222	I. 706.778	9.1
Oreg. Short Line	583,017	455,483	I. 127,534	28.0
Net earnings	160,988	102,661	I. 58,327	56.6
Southern Pac. Co.:				
Atlantic System	2,823,798	2,705,621	I. 118,177	4.4
Net earnings	733,096	1,080,971	D. 347,875	32.2
Pacific System	6,603,614	6,367,089	I. 236,525	3.7
Net earnings	3,099,241	2,957,979	I. 143.262	4.8
Texas & Pacific	1,677,110	1,443,808	I. 233,302	16.2
Net earnings	261.385	.....	.....	...
Wab., St. L. & P	3,919.982	4,887,553	D. 967,571	19 9
Net earnings	818,075	321,556	I. 496,519	154.1
West Shore	1,220 000	1,127,000	I. 93,000	8.2
Month of April:				
Bur., C. R. & No.	$209,100	$245,457	D. $36 357	14.8
Net earnings	43,684	80 463	D. 36.779	45.9
Cl., C., C. & I	253,272	246,823	I. 6,447	2.6
Den & R. G	484.653	449,659	I. 34.994	7.8
Net earnings	162.309	135 607	I. 26.702	19.8
Des M. & Ft. D	22,441	28.415	D. 5,971	21.3
Net earnings	2,847	3,317	D. 470	16.2
L. R., M. R. & T.	23,107	16,989	I. 6.118	36 0
N. Y. C. & H. R.	2,049,000	1,816,000	I. 233.000	12 8
Oreg. Short Line	193,411	146,793	I. 46.618	31.7
Net earnings	84,182	56,557	I. 27.625	48.4
So. Pacific Co.:				
Atlantic System	795,148	695.643	I. 99,505	14.2
Net earnings	231.431	302,126	D. 70,695	23.5
Pacific System	1,758.525	1,644,617	I. 93,908	5.6
Net earnings	788,372	857,422	D. 69 050	8.1
Texas & Pacific	453.914	361.494	I. 92.420	25.6
Net earnings	62,085	26,180	I. 35.905	138 0
Wabash, St. L. & P	1,028,339	1,114,483	D. 86,144	7.7
Net earnings	239,699	*17.055	I. 256,154	....
West Shore	314,000	305,000	I. 9.000	2.9
Month of May:				
Ala. Gt. South	$78,275	$78,224	I. $51	0.1
Char., Col. & A	46,344	46,286	I. 58	0.1
Cin., N. O. & T. P.	195,232	187,247	I. 7.985	4 3
Col. & Greenville	28,763	35,617	D. 6,854	19.1
Cleve. & Canton	29,254	27,380	I. 1,874	6.9
Net earnings	8,958	6.009	I. 2.949	49.1
K. C., Ft. S. & G.	173,296	199,085	D. 25,789	12.9
K. C., Spr. & M	118,960	134,768	D. 15,808	11.7
N. O. & N. E	43,948	49,764	D. 5,816	11.6
Pennsylvania	4,178.580	3,890,469	I. 288.111	7.4
Net earnings	1,472,702	1,355,295	I. 117,407	8.7
South Carolina	58,416	58,104	I. 312	0.5
Vicks. & Mer	36,286	25,929	I. 10,357	39.8
Vick., Shre. & P.	20.272	21.8 6	D. 1.554	7.1
Va. Midland	117,023	119,339	D. 2,316	1 9
Western N. C	32,986	36,437	D. 3,451	9.5
Second week in June:				
Buff., R. & Pitts.	$17,219	$24,793	D. $7,574	30.5
Canadian Pac.	194 000	146.000	I. 48,000	32.9
Chi. & Alton	173,698	161,850	I. 11,848	7.3
Chi. & East. Ill.	30,139	28,025	I. 2.114	7.5
Chi., Mil. & St. P.	467 000	433.904	I. 33,096	7.6
Chic. & N. W	505,400	446.100	I. 59,300	13.3
Ch., St. P., M. & O.	110,600	102.700	I. 7.900	7.7
C., L. St. L. & C.	42,555	41,500	I. 1,055	2.5
Denver & R. G	123,065	122,578	I. 487	0.4
Ill. Central	204,900	203,776	I. 1.124	0.6
Iowa lines	38.600	34,857	I. 3,743	10.7
Long Island	74,845	67,769	I. 7,076	10.4
Louisv. & Nash	249,995	239,516	I. 10,485	4.4
Mil., L. S. & W.	53,555	23,335	I. 30,220	129.0
Mil. & Northern	10,935	10,485	I. 450	4.3
St. L. & San F.	85,000	65,300	I. 19,700	30.2

* Deficit.

Weekly earnings are usually estimated in part, and are subject to correction by later statements. The same remark applies to early statements of monthly earnings.

Central Traffic Association.

The Executive Committee of the Central Traffic Association in Chicago, June 17, adopted a resolution calling a meeting of the Passenger Department at Cresson Springs, Pa., Monday, June 28, for the purpose of considering the following subjects:

(A)—Special fares.
(B)—Basis for percentages.
(C)—Payment of commissions.
(D)—Progress toward arbitration.
(E)—Merger of the Central Passenger Committee with the Central Traffic Association.
(F)—The relations of the Passenger Department to roads not members thereof.
(G)—Any special business.

This meeting is to be followed on June 29 by a meeting of the general managers, and the first thing to be considered in the managers' meeting is the action of the Passenger Committee of the previous day upon the above points.

Therefore the meeting called at Chicago for June 23 is postponed to Cresson Springs, Pa., Monday, June 28, at 9 a. m., and it is hoped that every member will be present in person, prepared to act definitely and finally upon each of the above named questions.

Commissioner Blanchard gives notice that there will be, at Cresson Springs, Pa., on Tuesday, June 29, a meeting of the managers, at which the following subjects will be presented:

"1. The action of the passenger committee on the previous day.

"2. The determination of methods by which outlying points shall be consolidated into Chicago, Peoria and St. Louis, as heretofore agreed. It is hoped that the parties interested therein will at that time present their statistics, and that they can agree without arbitration upon the points involved, otherwise to arrange for such arbitration.

"3. To consider the important question of weighing all live stock, and the minimum weights to be charged on live stock loaded in cars of different lengths.

"4. To consider and determine questions pertinent to the Peoria contract, and the traffics to be included therein.

"5. The consideration of the report of the conference committee upon the majority and minority percentage reports.

"6. To ratify the proceedings of the executive committee, including the addition of three names to that committee.

"7. To determine when regular meetings of this association shall be called.

"8. Any other business pertinent to the purposes of the Association which may be presented by any member thereof or by the Commissioner."

Cotton.

Cotton movement for the week ending June 18 is reported as follows, in bales:

	1886.	1885.	Inc. or Dec.	P. c.
Interior markets:				
Receipts	12,325	5,269	I. 7,056	133.1
Shipments	27,392	13,027	I. 14,365	110.5
Stock, June 18	105,274	39,943	I. 65,331	163.4
Seaports:				
Receipts	24,881	2,887	I. 21.994	758.5
Exports	52,028	23,261	I. 8,767	37.6
Stock, June 18	425,218	361,561	I. 63,657	17.6

The total movement from plantations for the crop year to June 18 is estimated at 6,419,305 bales, against 5,583,943 last year, 5,616,258 in 1883–84, and 6,880,623 in 1882–83.

Petroleum.

The production, shipments, etc., of the Pennsylvania and New York oil wells for May are given by *Stowell's Petroleum Reporter* as follows, in barrels of 42 gallons:

	1886.	1885.	Inc. or Dec.	P.c.
Production	2,178,773	1,771,371	I. 407,402	23 0
Shipments	2,032,672	2,097,099	D. 64,427	3 2
Stock, May 31	33,969 486	36,139,072	D. 2,169,586	6.0
Producing wells	24,533	22,233	I. 1,300	5 6

For the first time since August, 1884, the production exceeded the shipments for the month. Of the total production the Alleghany District in New York furnished 6.7 per cent.; the Bradford District, 27.3; the Warren District, 13.4; the Lower District, 38.2; and the new Washington District, 14.4 per cent.

The shipments were exceeded in 10 out of the 12 months of the past year. Of the shipments reported from the wells for the month 839,654 barrels, or 41.3 per cent., were by rail, the rest by pipe lines.

The stock on hand increased 146,101 barrels during the month, that being the excess of production over shipments.

There were 343 new wells completed during the month and 45 dry holes developed. At the close of the month 358 new wells were reported under the drill, with preparations in progress to drill 205 more.

Northwestern Passenger Rates.

The passenger war among the lines running from Chicago westward continues unabated, the Rock Island and the Milwaukee & St. Paul, the principal contestants, having both reduced rates from Chicago to St. Paul to $3. Heavy cuts have also been made in the rate from Chicago to Council Bluffs, and to Rock Island, Davenport, Cedar Rapids and other competitive points in Iowa. There is at present no immediate prospect of a settlement of the difficulties.

Western Freight Association.

The Chicago & Northwestern Co. last week gave notice of its withdrawal from the Western Freight Association. The Missouri Pacific, the Rock Island and the Omaha roads recently withdrew from the Association, and this action of the Northwestern practically puts an end to its existence.

RAILROAD LAW.

Railroad Tracks as a Public Nuisance—Rights of Individuals.

In the case of Dubach against the Hannibal & St. Joseph Co., the Missouri Supreme Court holds as follows.

Where the charter of a railroad company authorizes it to build its road over streets, alleys, etc., in any town or village, etc., but required the company to so construct the road "as not to hinder or prevent the public from using the same," and where it appears that the character of a street is such that defendant's track could not be laid upon it without hindering the public from using it, equity will enjoin such company from laying its track upon such street, at the instance of the owner of an abutting lot upon which he conducts his business as a lumber merchant, notwithstanding that the track laid as proposed would be a public nuisance.

OLD AND NEW ROADS.

Americus, Preston & Lumpkin.—At the annual meeting in Americus, Ga., last week it was resolved by the stockholders to increase the stock from $100,000 to $200,000, the new stock to be used for improvements and extension of the road.

Atchison, Topeka & Santa Fe.—It has been rumored for some time that this company intended to build a line of its own from Kansas City to Chicago, and this report has continued to find believers, although contradicted by officers of the company. The latest rumor is that the company will not build a line of its own, but that it is negotiating for a controlling interest in the Chicago & Alton stock, as noted elsewhere.

A rumor is also current that the company is negotiating for the purchase of the Rio Grande Division of the Texas & Pacific road. This rumor seems to be based somewhat on the presumption that the Atchison Co. is ready to buy up any Southwestern road which the owners may be willing to part with, rather than upon any definite or certain information.

Atchison & Western.—This company has been organized to build a railroad from Atchison, Kan., westward to Clay Centre, a distance of 150 miles.

Atlantic, Greenville & Western.—This company has let contracts for building 55 miles of its projected road from Augusta, Ga., to Ninety-six, S. C., the grading to be completed by October next.

Augusta, Edgefield & Newberry.—Contracts were to be let this week for grading this road from Newberry, S. C., southward to the Saluda River, a distance of 10 miles.

Boston & Lowell.—A special meeting of the stockholders was to be held in Boston, June 24, to vote on the question of accepting the recent act of the Legislature authorizing the directors to buy stock and bonds of the Boston, Concord & Montreal, the Pemigewasset Valley, the Whitefield & Jefferson and the St. Johnsbury & Lake Champlain roads, with a view to consolidation; the necessary increase of stock for these purposes also to be acted on, as well as the proposed guarantee of the interest on the St. Johnsbury & Lake Champlain bonds.

Carthage & Adirondack.—Work on the grading of this road was begun last week at Harrisville, N. Y., and the road is to be pushed as fast as possible. It is to extend from Carthage, N. Y., on the Utica & Black River road, to Harrisville, a distance of 40 miles.

Central Transportation Co.—In the United States Circuit Court, in Philadelphia, June 22, the jury in the suit of this company against Pullman's Palace Car Co. rendered a verdict of $119,729 in favor of the Central Co., the

amount awarded being two quarters' rent under the terms of the original lease of 1870. This decision confirms the claim of the Central Co., that the original lease remains in force. As it had been agreed between the parties that another suit for rental should abide by the decision in the test case, the sum actually recovered amounts to about $380,000. The defendant made a motion for a new trial in the case.

Central Vermont.—This company has leased the Ogdensburg & Lake Champlain road under a perpetual lease, dated June 1, as noted elsewhere.

It is reported that the company has sold the Stanstead, Shefford & Chambly and the Waterloo & Magog roads in Canada, which it has owned for a long time, to the Canadian Pacific Co. The two roads form a branch running from St. John, Que., to Sherbrooke, and will probably be used by the Canadian Pacific as part of its projected line across Maine to St. John.

Chicago & Alton.—A report is current that some of the large holders of stock in this company have sold their stock to Boston parties who are interested in the Atchison, Topeka & Sante Fe, and that the purchases are intended to give that company control of the road. The Chicago & Alton is not a speculative stock, being very largely held for investment, and in large blocks. A purchase of a controlling interest would not necessarily give the purchasers control of the board for some time, as only one-third of the directors are chosen each year, and the new owners would have to wait at least two years to secure a majority of the board, unless vacancies were made by resignation.

Chicago, Burlington & Northern.—The statement of track laid for the week ending June 13 is as follows:

	Miles.
Newport south	7.254
La Crosse south	5.189
East Dubuque north	3.409
" " south	0.720
Savanna north	0.398
" east	0.057
Oregon west	6.553
Total	23.580

The total main line track previously reported was 197.310 miles, making a total of 220.890 miles of main line laid up to June 13.

Chicago, Burlington & Quincy.—The 12 miles line just begun from Galesburg north to Rio, Ill., will complete a loop of the St. Louis & Rock Island Division, which diverges from its southward course at Rio and turns southwestward, until at Monmouth it is 15 miles west of Galesburg, but 17 miles south of Monmouth it turns southeastward and crosses the main line to Quincy at Bushnell. By this division the distance from Rio to Bushnell is 49 miles; by the new road and the main line to Quincy it will be 40 miles. From Rock Island to Peoria it will shorten the distance 22 miles. The opening of the Chicago, Burlington & Northern will greatly increase the traffic for which this shortening of the route will be available, making a new and direct line from St. Louis to St. Paul.

Chicago, Milwaukee & St. Paul.—This company gives notice that its fast limited 12-hour train between Chicago and St. Paul has been so successful that it has decided to run a second fast train, and has therefore shortened up the time of its day express over 3 hours.

Chicago & Northwestern.—Several short lines are under construction or about to be begun to fill gaps or make extensions of existing lines. In Iowa work is progressing on a line from Lake City, the present western terminus of the Dayton & Lake City line, westward about 17 miles to a junction with the Maple River Railroad Branch near Wall Lake, while the Maple River road itself will be extended from its present western terminus at Mapleton, southwest about 20 miles to the Sioux City & Pacific Railroad at Onawa. These two short lines will complete a line nearly parallel with the main line to Council Bluffs from a junction with that line at Tama to Onawa, near the Missouri River, which will be 210 miles long, and which will be available for carrying the traffic of the Dakota and Nebraska lines, and can be used to relieve the main line to Council Bluffs without building a second track. The line to the western Iowa border at Hawarden, which from Tama to Jewell Junction, 69 miles, is identical with the above, remains the shorter outlet of the Dakota lines as an alternate with the Winona & St. Peter.

In Dakota the branch extending from the Dakota Central at Huron northward up the James River Valley to Columbia, 97 miles, is to be extended further north to meet the James River Branch of the Northern Pacific, which will be extended southward somewhat, and an agreement has been made by the two companies for an interchange of traffic between the two branches. The Northern Pacific line will also connect with the Milwaukee & St. Paul's line in the James River Valley. The Northwestern also contemplates building an extension of the line in Dakota which continues the Winona & St. Peter road west to Redfeld, on the James River Valley line, the new line to extend from Redfield westward some 60 miles toward the Missouri River, on a route parallel with and about 25 miles north of the Dakota Central line to Pierre. The country on the line is pretty good, and very favorable for construction, and seems likely very soon to afford a paying traffic.

It has not been decided to build the branch to the Republic mine in the Upper Peninsula of Michigan, which a Marquette paper reported to be certain. A proposal to that effect has often been made within the past six or eight years, and it has been seriously considered more than once, but no decision has been made as yet.

Chicago, St. Paul, Minneapolis & Omaha.—The Sioux Falls Branch, which now extends from the St. Paul & Omaha line near Worthington, Minn., west 98 miles to Salem, Dak., on the Hawarden-Iroquois line of the Northwestern, is to be extended westward about 35 miles to Mitchell, the junction of the James River Valley and the Iowa & Dakota lines of the Milwaukee & St. Paul. The intimate relations of Southern (as well as Northern) Dakota with St. Paul, Minneapolis and Lake Superior have caused a demand for a more direct outlet in that direction in this case as well as in that of the Yankton Branch of the Chicago & Northwestern.

Cincinnati, Indianapolis, St. Louis & Chicago.—As already noted this company has made arrangements to issue $10,000,000 in consolidated 4 per cent. bonds, for the purpose of retiring as soon as possible the present bonded indebtedness of $9,000,000, which bears 6 and 7 per cent. interest. This leaves $1,000,000 of the new bonds to be disposed of, and the company has sold these bonds to New York and Boston bankers at par. These bonds are secured by a general mortgage upon all the property owned by the company.

Cleveland, Lorain & Wheeling.—Surveys have been made and work will shortly be begun on an extension of this road from its present terminus at Bridgeport, O., opposite Wheeling, southward to Bellaire, a distance of 2½ miles.

Columbia, Newberry & Laurens.—This company has been organized to build a railroad from Columbia, S. C., through Prosperity and Newberry, to Laurens. Surveys for the road are to be made at once.

Columbia & Rensselaer.—Articles of incorporation have been filed by this company, which purposes building a railroad about 30 miles long, from Hudson, N. Y., northward through Stockport, Stuyvesant, Kinderhook and Ballatie, to Nassau. The general course of the road will be parallel to the Hudson River, but from 5 to 10 miles east of it.

Columbus & Western.—It is stated that work will soon be begun on the extension of this road from its present terminus at Goodwater, Ala., to Birmingham, where connection will be made with the lines running west and north from that city, and more especially with the Kansas City, Memphis & Birmingham road. The greater part of this extension was located, and some of it graded, several years ago, but a new survey is to be made.

Connecticut Central.—The Hartford (Conn.) *Courant* of June 22 says: "The time limit for redemption under the decree of foreclosure granted against the Connecticut Central road expired yesterday. The decree was granted on a suit brought for defaulted interest on bonds and the decree granted by Judge Andrews. An appeal from the decision of the Superior Court, has, however, been filed, and the case will go to the October term of the Supreme Court."

Covington & Macon.—The grading on this road is now completed within about 15 miles of Covington, Ga., and track-laying has been begun near Macon.

Denver & Rio Grande.—The Receiver's statement for April and the four months to April 30 is as follows:

	April.	Four months.
Earnings	$484,653	$1,814,486
Expenses	322,254	1,242,671
Net earnings	$162,399	$571,815
Other income	5,369	30,276
Total	$167,768	$602,091
Insurance, betterments, etc.	67,074	178,965
Balance	$100,694	423,126

For the four months the gross earnings increased $72,716, or 4.2 per cent., and the expenses decreased $12,508, or 1.0 per cent., the result being a gain of $85,224, or 17.5 per cent., in net earnings.

Dubuque, Mt. Auburn & Southwestern.—This company has been organized to build a railroad from Dubuque, Ia., through Mt. Auburn to Chariton.

Florida Southern.—The southern extension of this road is now completed from the South Florida road at Lakeland, Fla., south to Punta Garda on Charlotte Harbor, a distance of 72 miles. The new terminus at Punta Garda is 249 miles from Palatka on the St. Johns River and 219 miles from Gainesville. The company has made arrangements for a line of steamers to run between Charlotte Harbor and New Orleans.

Gulf, Colorado & Santa Fe.—This road has been formally turned over to the Atchison, Topeka & Santa Fe Co., a majority of the board now representing that company. The new directors take the place of four of the Galveston directors who have resigned.

Houston & Texas Central.—It will be remembered that on May 26 the United States Circuit Court in Galveston gave a decision, sustaining the demurrer and dismissing the suit of the Southern Development Co. against this company. At the same time the Court discharged the Receivers appointed in that suit and appointed new receivers in the interest of the bondholders. The Southern Development Co. entered notice of appeal to the United States Supreme Court. In Galveston, June 22, the Circuit Court allowed this appeal and directed that it should act as a *supersedias* to the decree so far as the dismissal of the suit is concerned, but the *supersedias* will not affect that portion of the decree appointing the new Receivers, and they will consequently remain in possession.

Kansas City, Fort Scott & Gulf.—Surveys are being made for a branch of this road, to extend from Bolivar, Mo., to Fairplay, a distance of 10 miles. This branch is intended to develop a new coal district.

Lake Shore & Michigan Southern.—The switchmen employed in the Chicago yards struck on the afternoon of June 23, stopping all freight traffic. The cause of the present strike, according to the men, is the failure of the Lake Shore Co. to carry out the terms of the agreement upon which the switchmen's strike of April last was settled. The ambiguity of the agreement was pointed out at the time, and even then both sides claimed a victory. The switchmen then struck for the removal of eight objectionable non-union men. After a week of trouble the strike ended, some one having promised that if the men would return to work the eight objectionable men would not be in the employ of the Lake Shore Co., at least in Chicago, at the expiration of 60 days. The company claims that no promise was made by any one authorized to act for it.

Lehigh & Hudson River.—This company is making arrangements to run a milk train over its road to Belvidere, and thence over the Pennsylvania Railroad to Philadelphia. The transportation of milk from Orange County, N. Y., and Sussex County, N. J., to Philadelphia, will be something new, all the milk from that region having always gone to New York, but it is said that there is a short supply on the Philadelphia market and that milk commands a higher price there, while the Pennsylvania Railroad is willing to run a fast train from Belvidere in order to carry it.

Long Island Elevated.—This company has been organized to build an elevated railroad in Brooklyn, N. Y., in the interest of the Long Island Railroad Co. Application has been made for the necessary permission to construct the road.

Lynchburg, Halifax & North Carolina.—The city of Lynchburg has voted by a large majority to subscribe $250,000 in aid of the construction of this road, which is to run from Lynchburg to Durham, N. C. Other votes of local aid are expected along the line.

Mann Boudoir Car Co.—This company has made arrangement to run its cars again this season between Boston and the White Mountains over the Boston & Lowell road. The cars will run on both express trains between Boston and Fabyan.

Marquette, Houghton & Ontonagon.—This company has completed the work of laying track on a new branch extending from Negaunee southeast, to some new mines recently opened. The branch is about 2½ miles long.

Mexican Central.—The following circular to bondholders has been issued from the Boston office: "From various causes the earnings of the company have not met the expectations entertained in December last, and no money has been received from the government subsidy. The company is able to pay only half of its interest in cash. There are over $4,000,000 first-mortgage assented bonds in the treasury, unpledged for any purpose, and after consultation with many large and small bonders, comprising a majority, all of whom unanimously recommend such action, the company has decided to offer in payment of the No. 10 coupons of its first-mortgage assented bonds and the No. 4 coupons of its coupon notes, both due July 1, 1886, and the No. 3 coupons of its debenture bonds, due Oct. 1, 1886, upon presentation and surrender as they respectively fall due, 50 per cent. in cash and 50 per cent. in first-mortgage assented bonds at par, bearing interest from the due date of the respective coupons. As these bonds are only in denominations of $1,000 each, negotiable scrip will be given for fractions.

"Upon presentation and surrender of the No. 10 coupons of the first-mortgage assented bonds and the No. 4 coupons of the coupon notes, due July 1, 1886, at the office of the company in Boston, on and after that date payment will be made as above stated."

The *Mexican Financier* says: "We have received many inquiries as to the actual condition of the road-bed of the Central railroad, and will here reply to all such questions. The Central is a far better road than many of the western railways in the United States. Its heavy steel rails are practically unworn. They are good for many years yet. The masonry of the bridges and culverts is remarkably well done and has received the commendations of competent observers. We know of few roads in the United States over which one rides more smoothly. The division superintendents are competent and efficient railroad men and are keeping their respective divisions in good order. It is true that that a great many ties will have to be put in, especially between Calera and Chihuahua the coming year, but with the present amount of traffic, were the freight rates fixed at a reasonable and living figure, the road would not only pay operating and repair expenses but leave enough over to meet interest charges. The equipment of the road is first-class. No better Pullmans are run over any road in the United States. The locomotives are in good order. It should be the policy of the road—doutless it is—to replace the hundreds of little wooden bridges with iron or masonry, and the telegraph poles along the line require frequent replacement."

Michigan Central.—Notice is given that the $1,000,000 Grand River Valley first-mortgage bonds maturing July 1 next will be paid on and after that date at the office of the Union Trust Co. in New York. These bonds were issued in 1866 and bore 8 per cent. interest.

Minnesota & Northwestern.—It is stated that this company's agents are now actively engaged in securing right of way in Illinois for the projected extension of the road to Chicago. Several purchases of property have been made along the line from Freeport, Ill., eastward.

Mobile & Ohio.—A report is telegraphed from New Orleans to the effect that this company will lease and operate the New Orleans & Northeastern road. It seems to be based on the fact that the Mobile & Ohio now sends its New Orleans freight over the Northeastern road from Meridian, and that negotiations are pending for the establishment of a through passenger line between St. Louis & New Orleans by the same route.

Mobile Railway & Harbor Co.—This company has been organized at Mobile, Ala., to build a railroad from that city to Dauphin Island, and to make a harbor and build docks at the terminus. The road to be built will be about 32 miles long.

Nashville, Chattanooga & St. Louis.—The gross and net earnings for May, and for eleven months from July 1 to May 31 were as follows:

	May.		Eleven months.	
	1886.	1885.	1885-86.	1884-85.
Gross earnings	$172,329	$167,495	$2,009,971	$2,093,019
Operating expenses	111,049	101,499	1,219,924	1,218,205
Net earnings	$61,280	$65,996	$790,047	$874,814
Interest and taxes			618,931	626,139
Balance, surplus			$171,116	$248,675

This shows for the eleven months a decrease of $83,048, or 3.9 per cent., in gross earnings; of $84,767, or 9.7 per cent., in net earnings, and of $77,559, or 31.1 per cent., in surplus income.

New England & Southwestern.—A report has been circulated to the effect that negotiations are pending with the Pennsylvania Railroad Co. for the building of an extension of its road to connect with this projected line, which includes the proposed bridge over the Hudson River at Storm King Mountain. This report has been most emphatically denied by the officers of the Pennsylvania Railroad Co., who say they have no intention whatever of building the line noted or of taking any part in the construction of the proposed bridge.

New York & New England.—Arrangements have been completed under which the Erie Dispatch Line will hereafter run over this road to Boston and to all the points on the road. There has been for some time past no fast freight line operating over the road.

Ogdensburg & Lake Champlain.—The Central Vermont Railroad Co. has taken a lease of the Ogdensburg & Lake Champlain road, the papers being signed June 14. There is no change at present in the heads of departments of the Ogdensburg & Lake Champlain. The lease dates from June 1, the lessee taking formal possession of the property June 15. The lease is a perpetual one, and is made to the Consolidated Railroad Co. of Vermont, by whom it is assigned to the Central Vermont Co. By the terms of the lease, the Central Vermont is to pay out of the earnings of the Ogdensburg & Lake Champlain road the interest on the bonds of that road which are thus secured. The Central Vermont is the principal shareholder in the Ogdensburg & Lake Champlain road, and has had virtual control thereof for two years past; and this lease is effected for the purpose of solidifying the Central Vermont line, bringing all under one management, reducing expenses and securing greater efficiency to the line. The lease includes the boat line from Ogdensburg to Chicago, and gives the Central Vermont a through line from Windsor and White River Junction to that western port. The lease was formally approved by the stockholders at the annual meeting held in Ogdensburg, June 16. The full terms of the lease have not been made public; but the interests of the income bondholders are said to be protected.

Old Colony.—The officers of this company deny the report that the company has purchased the Nantasket Beach Railroad. There have been no changes whatever in the relations for the past two years.

Oregon & California.—London papers state that the bondholders' committee has reported concerning the negotiations with the Central Pacific Railroad Co., and the proposals made on behalf of the Southern Pacific Co. A hitch in the negotiations has arisen since Feb. 15, owing to the discovery that, in the opinion of counsel in New York, the Central Pacific could not properly lease the Oregon & California road because it was itself leased to the Southern Pacific. The principal differences in the advantages which the certificate

holders were to receive under the plan approved by them and those which they are to receive under Mr. Huntington's new proposals are these: (1) the interest on the new bonds is, under the new proposal, to commence July 1, 1886, instead of April 1, 1886, and the principal is to be repayable July 1, instead of April 1, 1926. (2) The option which the plan secured to the London committee of requiring for the certificate holders either a second £2 per bond, or, in the alternative, the right to subscribe for a further amount of new bonds, is replaced by a mere right to subscribe for new bonds without the option of claiming cash, and the price of the subscription is somewhat increased. Under the new proposal the old bonds are to be surrendered at once, and in certain contingencies nothing but scrip of the Southern Pacific Co. may for some time be obtainable, without submitting to onerous engagements. Lastly, there is the substitution of the Southern Pacific Co. for the Central Pacific Railroad Co. as the company which is to guarantee the new bonds. The committee are making inquiries into its legal and commercial position, preparatory to laying the new proposal before a meeting of the certificate holders, for them to decide on the course to be taken with respect to it.

Pennsylvania.—The statement of the business of all lines east of Pittsburgh and Erie for May, 1886, as compared with the same month in 1885, shows an increase in gross earnings of $288,111, an increase in expenses of $170,704, and an increase in net earnings of $117,407. The five months of 1886, as compared with the same period of 1885, show for the same lines an increase in gross earnings of $1,330,108, an increase in expenses of $622,032, and an increase in net earnings of $708,076.

Carrying out these differences, we have the following statement:

	May.		Five months.	
	1886.	1885.	1886.	1885.
Earnings	$4,178 580	$3,890,469	$18,914,067	$17,583,959
Expenses	2,735,878	2,535,174	12,595,772	11,973,740
Net earn	$1,472.702	$1,355 295	$6,318.295	$5,610,219
P. c of exp.	64:8	65.2	66.6	68.1

All lines west of Pittsburgh and Erie for the five months of 1886 show a deficiency in meeting all liabilities of $434,798, being a decreased deficiency, as compared with the same period of 1885, of $217,475.

Quincy, Missouri & Pacific.—The United States Circuit Court has confirmed the sale of this road, which was sold at auction on May 14 for $1,000,000.

Raleigh & Augusta Air Line.—Surveys are being made for a branch or extension of this road from Hamlet, N. C., the present terminus, southward to Florence, a distance of about 55 miles. At Florence connection will be made with the Wilmington, Columbia & Augusta and the Northeastern road. The extension will be parallel and close to an existing road in a country where there is certainly not business enough for two roads, and it is difficult to see the object of the extension unless the company intends building through to Charleston.

Rochester & Pittsburgh.—The New York Court of Appeals decision in the Rochester & Pittsburgh suit dismisses the appeal of Olmstead and others from the decision of the Supreme Court General Term. That decision confirmed the sale of the Rochester & Pittsburgh under foreclosure of the second mortgage and ordered the company to give a deed of its property to the purchasers. This Court of Appeals decision finishes the case so far as New York state is concerned. The reorganization now awaits the action of the Pennsylvania courts.

St. Louis, Salem & Little Rock.—In St. Louis, June 15, a decree of foreclosure was entered by Judge Lubke in the case of this road. The suit is entered by the Union Trust Co., trustee for the bondholders. There has been a default in interest on $1,000,000 of bonds for 4½ years. The road extends from Cuba, Mo., to Salem, 41½ miles, with 30½ miles of branches to iron mines. There are no bonds other than the first-mortgage. The business of the road is almost entirely in iron ore, and depends upon the state of the iron trade.

St. Paul & Duluth.—At the annual meeting in St. Paul, June 21, a resolution submitted by the board of directors, providing for a change in the application of the net income of the company to provide for improvements of the road and to secure terminal facilities in St. Paul, were laid over until the next annual meeting. The effect of this action would seem to be that the directors will be restricted for the present year to such amount as can be obtained from the net earnings of the company.

In the election of directors, Mr. Miller, who represented the Chicago, Milwaukee & St. Paul, and Mr. Winter, who represented the Chicago, St. Paul, Minneapolis & Omaha, in the board, are both dropped. This action seems to confirm the report that those companies had disposed of the stock owned by them in this road. The parties who bought the stock are not known, although there is a doubtful report that most of it has been taken in the interest of the Chicago, Burlington & Quincy.

St. Paul, Minneapolis & Manitoba.—The St. Paul *Pioneer-Press* of June 18 says: "A deed has just been filed for record by the St. Cloud, Mankato & Austin, conveying to the St. Paul, Minneapolis & Manitoba Co. all of its rights, franchises, right of way, road bed, etc., between St. Cloud and Hutchinson, the consideration being $295,030. This includes the completed section of the road to Richmond, and throws considerable light upon the Manitoba's intentions in that country. The section to Richmond is now being completed to Willmar, and grading contractors on that part of the road have been notified that as soon as their contracts are finished they will be given more work in the same vicinity. This is construed to mean either that the Manitoba will at once build that part of the St. Cloud, Mankato & Austin from Richmond to Litchfield and Hutchinson, and secure that portion of the land grant, or that it will at once extend the St. Cloud & Willmar on through Sioux Falls, in Dakota."

This company has sold the consolidated bonds in the treasury, about $1,000,000, to New York bankers at the market price. The proceeds are to be used for extensions now in progress. No more bonds will be issued under the consolidated mortgage.

Southern Pacific Co.—The statement for the four months to April 30 is as follows:

	Atlantic system.	Pacific system.	Total.
Earnings	$2,823,798	$6,603,614	$9,427,412
Expenses	2,090,702	3,504,373	5,595,075
Net earnings	$733,096	$3,099,241	$3,832,337
Rental of leased lines			186.721
Total net income			$4,019,058
Fixed charges		$4,051,344	
Construction and improvements		77,336	
			4,728,680
Deficit			$709,622

Fixed charges include interest, rentals, taxes, government requirements and Central Pacific guarantee. As compared with last year the total gross earnings increased $354,702, or 3.9 per cent., and the expenses $561,315, or 11.2 per cent., the result being a decrease of $206,623, or 5.1 per cent., in net earnings.

Southeast Midland.—This company has been organized to build an extension of the Cape Girardeau & Southwestern road, from Wappapello, Mo., west by north, to Salem in Dent County, a distance of about 90 miles. The greater part of the line will pass through an unbroken forest, mainly of hard wood, and the western end will reach the iron mining districts about Salem. Two logging roads, about 15 miles long in all, have been offered to the company to be used as part of its line.

Texas & Pacific.—The new or opposition plan of reorganization provides for a foreclosure of the existing mortgages, with the exception of the Texas school fund loan of $167,000 and the first mortgage of the Eastern Division, which amounts to $3,784,000. The new 5 per cent. mortgages, to run 50 years, are to be executed. The first is not to exceed $21,000,000 and the second $18,500,000. The second mortgage bonds are to be income bonds for the first three years, and to be a fixed charge to the extent of 2 per cent. during the fourth year, 3 per cent. during the fifth year and 5 per cent. thereafter. The new capital stock is to be $50,000,000, of which $32,164,600 is to be exchanged for existing stock. The remainder is to be used only in case new branch lines are constructed. In apportioning the new bonds the holders of $9,316,000 consolidated 6 per cent. Eastern Division ones are to receive an equal amount of first mortgage, and 20 per cent. in second mortgage bonds in exchange for principal and interest of the present bonds. Sixty per cent. in first mortgage bonds and 40 per cent. in second mortgage bonds are to be given to the holders of the $6,720,000 bonds of the New Orleans Division. The holders of the $13,728,200 of the Rio Grande Division bonds are to get 45 per cent. in first and 55 per cent. in second mortgage bonds. The $750,000 of terminal bonds are to be exchanged for 25 per cent. in first and 75 per cent. in second mortgage bonds. The holders of the $8,123,000 land-grant bonds are to receive the lands on which they are a first lien, and 20 per cent. in second-mortgage bonds on payment of 5 per cent. bonus. The Missouri Pacific's claim for $1,688,015 and other undefined sums, for which it holds $2,115,000 of collateral, will share in the plan to the amount of collateral, there being reserved for this purpose 25 per cent. of first and 75 per cent. of second mortgage bonds. The present capital stock is to be exchanged for the new stock on the payment of $7.50 per share, the holders also to receive second mortgage bonds for two-thirds of the amount of money contributed.

A dispatch from Fort Worth, Tex., under date of June 19, says the purchase of the Rio Grande Division of the Texas & Pacific by the Atchison, Topeka & Santa Fe is claimed to have been confirmed by Atchison officials, who say that the transfer will go into effect when the connection is made from Fort Worth to Kansas. When this is done the Atchison Co. will at once operate the Rio Grande Division.

The Receivers have been granted permission by the Circuit Court of the United States at New Orleans to issue receivers' certificates to the amount of $800,000, of which sum $500,000 is to be applied to the Rio Grande Division and $300,000 to the New Orleans Division. These certificates will bear interest at the rate of 6 per cent. per annum, payable semi-annually on Jan. 1 and July 1, and will run for five years, but may be redeemed at any time upon 30 days' notice. The certificates will be a first lien upon the net earnings of the divisions for whose benefit they are issued, and upon the railroad and property of the particular divisions, but are not in any wise to be a lien or charge upon the earnings or property of any other part or division of the company or upon its land grant bonds. They are stated to be a debt of the Texas & Pacific Railway subsequent to the existing incumbrances on its other properties. It is understood that the issue of these certificates is with the concurrence of the Reorganization Committee.

Union Pacific.—This company has sold all the St. Joseph & Grand Island first-mortgage bonds, which it has held for a long time past. The amount of these bonds, as stated in the last annual report of the Union Pacific Co., was $3,985,000. They were sold to Messrs. Lee, Higginson & Co. and Kidder, Peabody & Co., of Boston. The money thus obtained is to be applied to reducing the floating debt of the Union Pacific. The price at which these bonds were sold has not been made public, but they are now selling in New York at 107 to 108.

Vicksburg, Shreveport & Pacific.—It is reported that this company will soon begin work on a branch from Tallulah, La., southward to Lake St. Joseph, a distance of about 30 miles, through a rich cotton country.

Wabash, St. Louis & Pacific.—As noted briefly last week, the Court has conditionally confirmed the sale of this road under foreclosure. The Court approves the sale on certain conditions, viz.: that the balance of the $562,000 purchase money be paid on or before Aug. 1; and that the purchasers "shall procure from the trustees of the general mortgage of the Wabash, St. Louis & Pacific Railway Co. surrenders and cancellations of the following leasehold interests, reported by the master as offered for sale and not sold, to wit: The leasehold interest in the Council Bluffs & St. Louis; the leasehold interest in the Attica, Covington & Southern; the leasehold interest in the Clarinda & St. Louis; the leasehold interest in the Des Moines & St. Louis; the leasehold interest in the St. Louis, Jerseyville & Springfield; the leasehold interest in the Champaign & Southwestern; and shall also procure the consent of the Wabash, St. Louis & Pacific Railway Co., defendant, and of the said several lessors to the surrender and cancellation of each of said several leases, which shall also be entered of record in this cause. And any deficit or loss incurred by the Receivers herein from the operation of any of said railroads, as also of the Eel River Railway, from June 1, 1886, shall, as a further condition of the confirmation of said sale, be charged upon the interest of said purchasers in the property acquired by them at said sale."

It is also provided in the decree that the confirmation of the sale shall be conditioned on the fulfillment of the original terms of sale, viz., that "in addition to the sums required by said decree of sale, and by this order to be paid into the Court in cash, there should be paid such further sums as may be needed, as this Court may direct, in order to meet claims which this Court may adjudge in this case to be prior in equity to the mortgages foreclosed by said decree, and whereby the Court directed that the railroads, property or interests sold thereunder should remain in the custody of the Receivers until such time as the Court should on motion direct said property in whole, or from time to time in part, to be released to said purchasers."

The St. Louis, Council Bluffs & Omaha coupons on first mortgage bonds, due Jan. 1 last, were paid at the National Bank of Commerce, New York, June 21, 1886.

The reorganization committee of the Omaha Division of the St. Louis, Kansas City & Northern Railroad has prepared an agreement for the bondholders to sign, in order that the committee may proceed with the foreclosure proceedings. Bonds assenting to the agreement are to be deposited with the United States Trust Co. within 20 days after a written request has been made by the committee and certificates given in exchange.

Wheeling & Lake Erie.—The United States Circuit Court has made a decree confirming the sale of this road under foreclosure to the committee representing the bondholders, and has directed the transfer of the road to the purchasers upon their paying the Receiver's indebtedness.

Wilkes-Barre & Western.—This company has filed articles of incorporation to build a railroad from Shickshinny, Pa., on the Bloomsburg Division of the Delaware, Lackawanna & Western, westward to Watsontown on the Philadelphia & Erie road. The projected line is about 50 miles long.

Wisconsin Central.—A dispatch from Milwaukee says: "General Manager Finney asserts that the new Chicago line will be opened for regular business some time during the first week in July. Only about 30 miles of ballasting between Holcomb and Chicago remains to be completed. Two through passenger trains between Chicago and St. Paul will be put on, and will make the same time as the Milwaukee and St. Paul trains at present."

ANNUAL REPORTS.

The following is an index to the annual reports of railroad companies which have been reviewed in previous numbers of the current volume of the *Railroad Gazette:*

Gulf, Colorado & Santa Fe.

At the close of the last fiscal year, Dec. 31, 1885, this company owned lines from Galveston, Tex., to Brownwood, 345 miles; Alvin to Houston, 24; Somerville to Conroe, 74; Cleburne to Dallas, 54; Temple to Fort Worth, 128; a total of 625 miles.

During the year extensions were built from Lampasas to Brownwood, 71 miles, and from Montgomery to Conroe, 18 miles; a total addition of 89 miles.

Since the close of the year the road has passed into possession of the Atchison, Topeka & Santa Fe Co., through exchange of stock, and work has been begun on an extension which is to connect the two roads.

The general account at the close of the year is as follows:

Capital stock		$4,560,000
Funded debt		11,234,000
Current accounts and balances		227,839
Income account, balance		3,588
Total		$16,025,427
Road and equipment	$14,739,207	
Other investments	514,937	
Materials on hand	412,011	
Accounts and balances receivable	284,026	
Cash	75,246	
		16,025,427

The funded debt includes $8,040,000 firsts and $3,194,000 seconds. During the year $1,200,000 firsts and $1,586,000 seconds were issued, and the floating debt was paid off. Construction account was increased by $1,916,046. The first-mortgage bonds are 7s and the second 6s.

Since the close of the year the company has issued and sold $1,806,000 seconds, making the total amount $5,000,000.

The earnings and income account were as follows for the year:

Freight		$1,383,704
Passenger		322,556
Mail and express		62.656
Miscellaneous		148,048
Total ($3,460 per mile)		$1,916,964
Expenses (70.5 per cent)		1,351,730
Net earnings ($1,020 per mile)		$565,234
Taxes and insurance	$47,042	
Interest on debt	602.417	
		650,359
Deficit for the year		$85,125
Balance from previous year		88,713
Income account, surplus, Dec. 31, 1885		$3,588

No comparisons can be made, as the previous report covered a period of 17 months, owing to a change in the fiscal year. Last year was a poor one on most of the Texas roads, and the gross earnings so far this year have shown a large gain.

During the year 160 miles of steel rails were laid and the equipment was increased by 5 locomotives; 5 passenger and 6 baggage cars; 231 freight and 7 service cars.

The company is now building extensions from Brownwood to the Colorado River, 70 miles, and from Fort Worth northward into the Indian Territory to meet the Atchison, Topeka & Santa Fe.